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JOHN AND MARTHA DANIELS

A NATURAL HISTORY OF THE DUCKS

IN FOUR VOLUMES

VOLUME II

RISING MALLARD

A NATURAL HISTORY OF THE DUCKS

BY

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WITH PLATES IN COLOR AND IN BLACK AND WHITE
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VOLUME II

THE GENUS ANAS

BOSTON AND NEW YORK
HOUGHTON MIFFLIN COMPANY
The Riverside Press, Cambridge
1923

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The Riverside Press
CAMBRIDGE · MASSACHUSETTS
PRINTED IN THE U. S. A.

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A NATURAL HISTORY OF THE DUCKS
THE GENUS *ANAS*

MALLARD

ANAS BOSCHAS LINNÉ

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SYNONYMY

?*Anas platyrhynchos* Linné, Systema Naturæ, ed. 10, vol. 1, p. 125, 1758.

Anas boschas Linné, Systema Naturæ, ed. 10, vol. 1, p. 127, 1758.

Anas domestica Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 2, p. 538, 1788.

Anas boscas Forster, Synonymic Cat. British Birds, p. 35, 1817.

Anas archiboschas Brehm, Oken's Isis, 1830, col. 997.

Anas (Boschas) domestica Swainson and Richardson, Fauna Boreali-Americana, vol. 2, p. 442, 1831.

Boschas domestica Swainson, Classif. Birds, vol. 2, p. 367, 1837.

Boschas fera Denny, Proc. Zool. Soc. London, 1847, p. 40.

Anas major Brehm, Vogelfang, p. 372, 1855.

Anas boschas, var. *pallescens* Olph-Galliard, Naumannia, 1855, p. 402.

Anas platyrhyncha Lönnberg, Journ. f. Ornith., vol. 54, p. 529, 1906.

NAMES GIVEN TO DOMESTIC BREEDS

Anas adunca Linné, Systema Naturæ, ed. 10, vol. 1, p. 128, 1758.

Anas curvirostra Pallas, Spicilegia Zoologica, pt. 6, p. 33, 1769.

Anas cirrhata, *Anas persica*, *Anas major*, *Anas grisea*, *Anas nævia*, *Anas nigra* Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 2, p. 538–539, 1788.

Anas salvadorii Büttikofer, Notes from Leyden Museum, vol. 18, p. 59, 1896.

Note: Lönnberg (1906) has endeavored to resuscitate Linné's *Anas platyrhynchos* for this species, on the ground that it applies to the male Mallard in eclipse plumage and has page priority over *Anas boschas;* but Oberholser (1921) considers the name not clearly identifiable. In view of this uncertainty, it seems better to retain the name so long in common use.

VERNACULAR NAMES

English: Mallard, Wild Duck, Green-head, Stock Duck, English Duck, French Duck, Gray Duck, Gray Mallard, Mire Duck, Moss Duck, Muir Duck.

French: Canard sauvage, Colvert, Gros Malard, Maillard, Bourre, Ainette, Guit, Halbrans, Lirots.

German: Stockente, Wilde Ente, Gemeine Ente, Blumente, Spiegelente, Blauente, Märzente, Grasente, Blaukopf, Blasente, Hagente, Rätschente, Stutzente, Stossente, Sturzente, Moosente, Grossente.

Danish: Græsand, Graand, Stokand, Kjærand, Moseand, Roand, Bygand.

Swedish: Gräsand, Stockand, Vildand, Akerand, Blahals.

Norwegian: Stokand, Duna, Vildand, Sildand, Laksand, Agerand, Kornand, Græsand.

Faroes: Vid ldunna.

Icelandic: Stokkönd, Graönd, Mejrönd, Blakollsönd, Kilönd.

Lapps: Stuora-vuojas.

Esthonian: Mets part.

Lettish: Mescha pihle, Merz pihle, Norma gish.

Finnish: Punajalka suorsa, Sinisorsa, Punasorsa, Isosorsa, Heinasorsa.

Russian: Kräkushka, Kraikownaya utka, Utka, Selesen, Kachka, Materaja utka.

Tartar: Kogal, Kas-urdak.

Polish: Kaczka krzyzowka.

Wendish: Wulka kacka.

Portuguese: Pato real.

Czechish: Kachna divoka.

Croatian: Patka gluvara.

Dutch: Wilde Eend.

Basque: Agalea, Ugata, Ata.

Spanish: Pato real, Pato galan, Anade, Pato salvaje, Colvert, Lavanco, Parrulo.

Sardinian: Anadi conca-birdi, Anadi reale, Crabu, Irdi, Conca-birdi.

Italian: Germano real, Anatra salvatica, Colle verde, Capo verde, Nedrot, Zison, Mazorin, Meddarda.

Maltese: Culuvert, Borca.

Hungarian: Kacsogo récze, Tökés récze.

Arabic: Boumou.

Turkish: Ordek.

Armenian: Bad.

Georgian: Garculi-ichivi.

Mordvinians: Jaksergae.

Cheremisses: Luda.

Samoyedes: Næbi.

Mongolian: Azin.

Kalmucks: Nogossum, Borodshin.

Lamuts: Nikis, Tarmi.

Kamchatkan: Saain, Lechlem.

Kuriles: Saangitch, Saaitchitch.

Hindustani: Nilsir, Lilgah, Niroji, Subz-zurdan, Sun-aurdak.

Turki: Suna aurdak.

Persian: Murghabi.

Japanese: Magamo, Awokubi.

Ostiaks: Wasa.

Mexican: Concanauhtli.

Eskimo: (*Labrador*) Mitterluk; (*Alaska*) Uk-shuk-puk, Yu-gukh-puk; (*Greenland*) Kaertlutok, Pigsik atartik, Piking arnakajik.

DESCRIPTION

Adult Male: Head and upper neck rich metallic green. Below this a well-marked white ring. Mantle and scapulars gray, more or less mixed with brown, and minutely freckled and barred with blackish. Upper back dark brown to blackish, rump and upper tail-coverts black, with rich purple and green reflections. Under tail-coverts purplish black. Breast rich chestnut merging more or less

MALLARD IN DISPLAY POSTURES

sharply into the silver white of the abdomen and flanks. Wing-coverts slaty brown except the last row. Speculum rich purple bordered anteriorly with a narrow black, and then a broad white bar, both on the coverts; bordered posteriorly by similar bars at tips of secondaries. Primaries ashy, under wing-coverts and axillars white. Four central tail-feathers sharply upcurled and glossy black; rest of tail ashy colored with the margins of the feathers white.

Iris dark brown. Bill brilliant lemon yellow to greenish yellow; nail black. Legs and feet coral red, more brilliant when the bird is in perfect condition.

Wing 260 mm. or even less, to 296, average about 280; bill 51–59, maximum 63; tarsus 46, maximum 48 or 49.

Weight 2.5 to 3.75 pounds (1.1 to 1.7 kilograms); maximum according to my notes 3.75, but heavier birds have been reported. European examples average slightly smaller than American.

Adult Female: General color dark brown above, with feathers of mantle, scapulars and back edged with buff or white. The under surface brown, more or less streaked with black, but here there is great variation, for some specimens are nearly plain silvery white everywhere except on upper breast, others very dark and heavily streaked. Chin and throat from immaculate buff to very pale, almost cream color. Wings same as in male.

Iris dark brown. Bill dull orange, irregularly splotched, especially about nostrils with blackish; nail black. Legs and feet less brilliant than in male. Size smaller than in male.

Weight 2 to 2.75 pounds (0.9 to 1.2 kilograms), averaging about 2.5 pounds (1.1 kilograms).

Young Female in First (Juvenal) Plumage: Very similar to the adult female, but lower surface always has a "stripey" or streaked appearance; upper surface may be difficult to distinguish from that of adult female. Bill and legs duller in color, and tail feathers blunt at the tips.

Young Male in First Plumage: Similar to young female on lower surface, but constantly darker and somewhat more uniform above, especially on the mantle, lower back and rump. The feathers of the top of the head lack the light edgings seen in those of the female, and the bill is clear olive green, not mottled. Size slightly larger than the young female. Tail feathers blunt at tips.

Male in Eclipse Plumage: Similar in general appearance to adult female, but darker on the upper side, without the characteristic light edging of the feathers. Pileum darker and more iridescent. Usually some admixture of previous plumage, or beginnings of autumn plumage. Curled central tail-feathers absent. Lower surface with the chin and throat more spotted than in the female and the upper breast darker and ruddier. This plumage was described as early as 1835 by C. L. Brehm (Oken's Isis, 1835, col. 238–240).

Downy Young: Upper surface blackish, overlain with long hair-like yellow feathers. There is a dark stripe running through the eye from the culmen to the occiput and a small dark aural patch. The under surface is sulphur yellow to yellowish buff. White areas occur on the wings, scapulars and sides of rump while a lighter area invades the sides of the mantle.

DISTRIBUTION

In the northern hemisphere, this species ranges in America from northern Alaska to southern Mexico; and in the Old World from the Arctic to northern Africa, India, China and Japan.

General

Few species of birds have a wider range or are represented by greater numbers than the Mallard. In view of this fact any ornithologist will realize that an attempt to treat its distribution exhaustively must inevitably result in failure. I shall, therefore, content myself with adducing what seems to me adequate authority for the statements made, and shall go into detail chiefly in the case of such countries or regions as are comparatively little known ornithologically.

Breeding Range

In the New World the Mallard breeds chiefly in the northern and western portions. According to L. M. Turner (1886) it nests in the Aleutian Archipelago on Attu and the Semidi Islands, having been observed also on Amchitka in late May, and on Unalaska during the breeding season. Nelson (1887) also has recorded its occurrence on the latter island during the nesting period. The species has bred on the Fur Seal Islands (Elliott, 1882; Palmer, 1899), while on the mainland of Alaska its breeding range extends, on the seacoast, north as far as the north shore of Kotzebue Sound (Nelson, 1887). It is, apparently, a rare bird in this region, if we may judge from the paucity of records and J. Grinnell's (1900) statement that it was scarce on the Kowak River. As to its status in Alaska as a whole, it is very difficult to reach a clear judgment, because of the conflicting statements of reliable men. L. M. Turner (1886) says it is common in the Yukon district, and this is borne out by Bishop (1900), who adds that these birds are especially plentiful at the mouth of the Yukon. On the other hand Turner (1886) found it more abundant on the upper than on the lower Yukon, and F. S. Hersey (1917) also remarks that it is not a common bird at St. Michael's. At any rate the species is evidently more common in southern Alaska, from the north shore of Norton Sound, south to the mouth of the Kuskoquim (Nelson, 1887). Nowhere in this area, however, is it very common; but at the base of the Alaska Peninsula it is said to be abundant (Osgood, 1904). J. Grinnell (1910) has recorded it for the Prince William Sound district, and Loring (1902) states that the species is common in Cook Inlet and Knik Arm. Farther to the southeast it is fairly common at Mole Harbor, Alexander and Beaver Lakes (J. Grinnell, 1910), the Chilkat River (Hartlaub, 1883), and Glacier Bay (W. S. Brooks, 1915). From the interior of Alaska it has been recorded from Nulato (Dall, 1873) and from the Porcupine River (U.S. Biological Survey) as well as from the Yukon in general (L. M. Turner, 1886; Nelson, 1887). It appears that the species breeds somewhat farther north in eastern Alaska, and in the extreme northwestern part of British America, for Ross (1862) records it for the MacKenzie north to the Arctic coast and for Fort Simpson, while MacFarlane (1908) found it on the MacKenzie and Anderson Rivers. Still it must be a very rare bird north of Great Bear Lake, and is not mentioned by Stefánsson (1913) as occurring north of Great Slave Lake. Kennicott (Baird, Brewer and Ridgway, 1884), however, found it at Fort Good Hope on the lower MacKenzie, and farther west it was met with rather commonly on the MacMillan River (Osgood, 1904). To the eastward Seton (1911) did not see any at the east end of Great Slave Lake or northeast of there. In the whole central region bounded on the west by the MacKenzie, on the north by Great Bear Lake, on the east by the Barren Grounds and on the south by the Saskatchewan River, the Mallard is a regular and common breeder (Preble, 1908). MacFarlane (1908) has also recorded it from the Great Slave and Athabasca Lake regions, and states that it is very common on both sides of the Saskatchewan River. About the Athabasca Delta, R. M. Harper (MS.) found it a common breeding bird.

Aleutian Islands

Alaska

Northwest Canada

Turning for a moment to the southwestern parts of British America we find the species an abundant resident and breeding bird throughout British Columbia (Fannin, 1891; Kermode, 1904; A. Brooks, 1917). Mallards are known to have bred also on Vancouver Island (Swarth, 1912). Eastward they are very common as breeding birds in Alberta, having been recorded for Edmonton (Soper, 1918), central Alberta (Stansell, 1909) and eastern Alberta (W. S. Brooks and Cobb, 1911), and in Saskatchewan (Spreadborough, *fide* J. and J. M. Macoun, 1909; Bent, 1907; C. B. Horsbrugh, 1915). I have already mentioned the statements of Preble (1908) and MacFarlane (1908) as to the abundance of these birds on the Saskatchewan River and northward. Further records are those for Quill Lake and Prince Albert Lake (Ferry, 1910, and others). Buchanan (1920) found the Mallard common and breeding in the lake region of central Saskatchewan and in the basin of the Churchill River. He met with it north even to the Cochrane River and Lake Du Brochet. In

British Columbia

Alberta

Saskatchewan

Manitoba the species is equally common (E. E. Thompson, 1891), especially on Shoal Lake (Taverner, 1919), Lake Winnipeg (MacFarlane, 1908), etc. Northward along the west side of Hudson Bay the species has been found all the way from Lake Winnipeg and Oxford House to York Factory and thence north on the Barren Grounds to Seal River and beyond (Preble, 1902), while southward it has been found at Moose Factory, on James Bay (U.S. National Museum). No doubt the species breeds throughout western Ontario and eastward to 78° west longitude. Langille (1884) and McIlwraith (1894) speak of it nesting on St. Clair Flats and I myself have heard of nests at Hamilton Bay and Long Point, Lake Erie. This region marks the eastern limit of its regular breeding range in Canada, but there are isolated summer records of Mallards in the Maritime Provinces and also in the eastern United States. Thus, the species is met with occasionally in New Brunswick (Chamberlain, 1882), on Prince Edward Island (MacSwain, 1908), and in Nova Scotia (Downs, 1888; Tufts, 1918). There are a number of records for Labrador, too, as far north as Ungava Bay (C. W. Townsend and Allen, 1907; Hantzsch, 1908).

Manitoba

Keewatin

Ontario

Maritime Provinces

In the United States, Mallards have bred sporadically in the western counties of New York State (Eaton, 1910) and in western Pennsylvania (B. H. Warren, 1890; Todd, 1904; Harlow, 1918). Possibly the Lake Region of these two States is to be included in the regular breeding range. But such records as those for Trenton, and for Burlington County, New Jersey (Harlow, 1918, and others), for Delaware (Rhoads and Pennock, 1905), for Maryland (Forbush, 1912), and for Virginia (H. H. Bailey, 1913; Whealton, *in litt.*) must be regarded as strictly extra-limital and possibly cases of semi-wild, or escaped birds. As was remarked above, 77° or 78° west longitude is evidently the eastern limit of the breeding range. This includes Ohio, where the species breeds quite regularly in small numbers (L. Jones, 1903; W. L. Dawson, 1903; Gossard and Harry, 1912), and Indiana where it is also known to breed (A. W. Butler, 1898). According to Barrows (1912) a few nest in Michigan, but other writers state that it is an abundant breeder in the south (Gibbs, 1879), especially on St. Clair Flats (Cook, 1893; J. and J. M. Macoun, 1909) and at Ann Arbor (Covert, 1876). In Wisconsin it still nests in small numbers (Kumlien and Hollister, 1903; Cory, 1909), especially in the southern parts (Kumlien and Hollister, 1903). The species nests also throughout Illinois (Cory, 1909) from the Chicago district (Woodruff, 1907) south to Mt. Carmel (Ridgway, 1895). I find no breeding records for any of the States on the south side of the Ohio River, excepting the old statement of Audubon that the species nests in Kentucky.

United States: Eastern

Central

West of the Mississippi the Mallard nests extensively in Minnesota (Hatch, 1892; Roberts, 1919) and in Iowa (R. M. Anderson, 1907), occasionally even south to northern and eastern Missouri (Widmann, 1907; U.S. Biological Survey). Recently an instance of its nesting near Winchester, in southeastern Arkansas, has been recorded (Hunt, Auk, vol. 38, p. 375, 1921). In Kansas it is a comparatively rare resident (Goss, 1886; Bunker, 1913; H. Harris, 1919), though it breeds even in the southern parts (Cooke, 1906), but northward, in Nebraska, it is not rare as a resident and breeds everywhere (Bruner, Wolcott and Swenk, 1905; Oberholser, 1920). On the other hand the species seems to nest less commonly in South Dakota (McChesney, 1879), excepting perhaps in Sanborn County (Visher, 1913), though in North Dakota it breeds everywhere (Job, 1899; Bent, 1901–02). In Montana also it is a common breeding bird almost everywhere (A. A. Saunders, 1921), the statement holding good also of Wyoming (Grave and Walker, 1913; W. C. Knight, 1902; Cary, 1917). According to Rockwell (1911), Felger (1909), and W. L. Sclater (1912) the species is common in summer and breeds in Colorado, while Cooke (1906) states that it breeds throughout New Mexico, and Wharton Huber collected many young in all stages in 1920, near Las Cruces, in the extreme southern part of the State. Recently, Wetmore (1920) has written at some length of the nesting of this species at Lake Burford, New Mexico. There is even a record for El Paso, Texas.

Western

In Arizona the Mallard breeds (Cooke, 1906), presumably in the Mogollon Mountains (Swarth, 1914) and in the southwest parts, where it was seen near Yuma in May (J.Grinnell, 1914). In Nevada a few may breed as they have been seen there in May and June (W. P. Taylor, 1912). In Utah the species nests abundantly about Great Salt Lake (Wetmore, 1921), while in Idaho it is also known to breed (Rust, 1915). According to W. L. Dawson and Bowles (1909) it is a common resident in Washington, a statement which applies also to Oregon (Pope, 1895 96). Grinnell, Bryant and Storer (1918) state that it nests throughout California. Even in Lower California nests have been found in the San Rafael Valley and at San Pedro Martir (Brewster, 1902).

Far Western

The Mallard is a resident bird in Greenland, breeding on the west coast from Julianehaab north to Godthaab and rarely north to Upernavik (Winge, 1899). On the east coast it has been found nesting as far north as Angmagsalik (Helms, 1910).

Greenland

In Iceland the species is a common breeding bird, generally distributed throughout the country (Slater, 1901; Hantzsch, 1905). It breeds also on the Faroes (Müller, 1869) and on the Shetlands (Saxby, 1874; Evans and Buckley, 1899). Throughout the British Isles it nests in suitable localities, being more common in Scotland than in England, and being the most abundant breeding duck in Ireland (G. R. Gray, 1871; Dresser, 1871–81; Seebohm, 1885; Ussher and Warren, 1900; Millais, 1902; Witherby *et al.*, 1919–22).

Iceland
Faroes
Shetlands
British Isles

On the Continent the species breeds throughout Scandinavia, excepting the extreme northern parts of Norway, where it does not go beyond Tromsö or Bosekop, 70° north latitude (Collett, 1873) though it breeds eastward to the Finnish border (Schaanning, 1913). In Sweden the species breeds from the extreme south northward to the frontier of Lapland (Nilsson, 1858; Dresser, 1871–81), but apparently rarely north of 68° north latitude (Wallengren, 1854). In Lapland it is a common breeder in the southern parts (Dresser, 1871–81). It has been found in the west not rarely at Enontekis (Suomalainen, 1912; Montell, 1917) and even north to Utsjoki, 69° 30′ north latitude (Palmén, 1876), and eastward in Syd Varanger (Schaanning, 1907). Finnilä (1913, 1914) met with the species, though rarely, in the Sodankyla region and in the Kuolajarvi district. Enwald (*fide* Pleske, 1886) has recorded it from the Tulona River, and Nikolski (*ibid.*) from the Murman coast, where, of course, the species is very rare. Southward it is said to be an abundant bird in Uleaborg (Dresser, 1871–81) and in central Finland (Suomalainen, 1908). Palmgren (1913) states that it is the commonest duck in the Helsingfors region.

Scandinavian Peninsula
Lapland
Finland

In Denmark the Mallard nests commonly (Kjärbölling, 1850), but in Holland and in Belgium comparatively few breed (Schlegel, 1859; Dubois, 1912). Nowhere in France is it a common breeding bird, but Ternier's (1897–98) careful study of its distribution in that country shows that it nests in practically all departments, particularly in the northwest, in the valleys of the Seine and the Loire. Even in Provence and Savoy it is known to nest (Clarke, 1895, 1898; l'Hermitte, 1916).

Denmark
Netherlands
France

In Spain the Mallard is generally distributed and nests throughout (Arévalo y Baca, 1887), though breeding much more commonly in the *marismas* of the lower Guadalquivir (H. Saunders, 1871; H. Noble, 1902) than in other localities. It appears to be the only member of the duck tribe that nests in Portugal, where its status is much the same as in Spain. Tait (1896) has recorded its nesting at Ovar, and Vieira (*fide* de Seabra, 1910) found nests at Maioroa. It is said to nest also on Flores, in the Azores (Godman, 1866). Furthermore it is a common breeder in Sardinia (Salvadori, 1865; Brooke, 1873) and in Corsica (Wharton, 1876; J. Whitehead, 1885; Jourdain, 1911). The species is said to be resident in Morocco (Favier, *fide* Irby, 1875) and is said to breed in Algeria (Loche, 1867; Menegaux, 1919). A few may nest also in Tunis (Whitaker, 1905). It certainly does so in Sicily (Malherbe, 1843) and in limited numbers

Iberian Peninsula
Azores
Sardinia
Corsica
Northwest Africa

MAP 28. Distribu

Breeding range, do

Sporadic rec

d (*Anas boschas*)
ange, broken line
rosses (×)

throughout the Italian peninsula, though apparently more commonly in the north (Giglioli, 1889–91; Arrigoni degli Oddi, 1904). It breeds also throughout Switzerland (Fatio, 1904), and in Luxembourg (La Fontaine, 1865–72). **Italy** **Switzerland**

In Germany the Mallard is a very common breeding bird, and has been so recorded for Schleswig-Holstein (Dahl, 1905), Oldenburg (von Negelein, 1853), the Rhine Provinces (Le Roi, 1906–07), Brunswick (R. Blasius, 1896), Brandenburg (Schalow, 1915), Pomerania (Holland, 1857), east Prussia (Hartert, 1892), Saxony (Heyder, 1913; Helm, 1905), Lusatia (Hantzsch, 1903), Bavaria (Jackel, *fide* Naumann, 1896–1905) and the Rhine Palatinate (W. and T. Heussler, 1896). **Germany**

In what was formerly the Dual Monarchy, the present species is likewise an abundant breeding bird. It nests commonly in Bohemia (Fritsch, 1872), in Austria (Mojsisovics von Mojsvár, 1897), in Styria and Croatia (Dresser, 1871–81), in the Tyrol (Althammer, 1857), possibly Dalmatia (Kolombatovič, 1903), in Slavonia (Clarke, 1884), in Herzegovina (Kadich, Mitth. Ornith. Ver. Wien, 1887, p. 67), throughout Hungary (von Madarász, 1884; Frivaldski, 1891), and in Transylvania (Danford and Harvie-Brown, 1875). In the Balkans, too, it is an exceedingly common nester; in Montenegro (Reiser and von Führer, 1896), in Albania (Lodge, 1909; Sperling, *fide* Dresser, 1871–81), in Greece (Powys, 1860; Krüper, 1862; von der Mühle, 1844; Lindermayer, 1860; etc.). Northward it was found nesting extensively about Monastir (P. J. C. McGregor, 1906) and in Macedonia (Sladen, 1917, 1918), as well as in Bulgaria (Reiser, 1894), in the Dobrudja (Sintenis, 1877; Alléon, 1886), Rumania (Radakoff, 1879; von der Mühle, 1844) and Bessarabia (Almásy, 1898). **Succession States** **Balkans**

The Mallard breeds abundantly in Poland (Taczanowski, 1888; Katin, 1912) and throughout most of what was formerly the Russian Empire. Here its breeding range extends from the Karelian coast in the northwest (Rae, 1881) and from Archangel (Goebel, 1873; Seebohm, 1882a; Harvie-Brown, 1877; etc.) southward, but not east to the Petchora (Harvie-Brown, 1876). Apparently a line drawn southeastward from the base of the Kanin Peninsula to northern Perm, that is, the line of the Timan Mountains, would mark the northeastern boundary of the breeding range in Europe. In Olonets and about Lakes Ladoga and Onega the species is, of course, a common breeder (Sievers, 1877). The same is true of the Petrograd region (Büchner, 1887; de Ditius, 1885; Bianchi, 1907), the Baltic Provinces (Goebel, 1873; Sawitzky, 1899; Loudon, 1909), Pskov (Zarudny, 1910), Smolensk (Poliakov, 1912), Novgorod (Bianchi, 1910), Vologda (Andréëff and Bianchi, 1910; Mejakov, 1856), Perm (Harvie-Brown, 1878), Kazan (Russki, 1893), Moscow and Tula (Menzbier, 1881, 1883; Lorenz, 1892), Orel (Daniloff, 1864), Kief (Goebel, 1869), Podolia (Belke, 1853), Cherson and the Crimea (Brauner, 1894, 1899), Ekaterinoslav (Valkh, 1911) and Charkov (Czernay, 1852). E. von Middendorff (1891) says it is a common breeder on the coasts of the Sea of Azov, and the same is true of Astrakan and the regions of the lower Volga (Moeschler, 1853; E. von Middendorff, 1891; Seebohm, 1883). **Poland** **Russia**

Throughout the Caucasus the Mallard nests in suitable localities (Radde, 1884; Seebohm, 1883), as it does in the interior of Asia Minor (Danford, 1878). The Taurus is probably the limit of the breeding area in this region. Bucknill (1910, 1911) believes that some may stay to breed on Cyprus, and Shelley (1872) in an earlier publication, stated that the species breeds even in lower Egypt. Since the statement was not repeated in his book, and since no later observers have mentioned it, it may be regarded as an error. Farther north the species nests in Armenia (Nesterov, 1911), in northwestern Persia (Radde, 1886; Zarudny, 1911) and throughout the rest of Persia, rarely in the Parapamis and Seistan regions (Zarudny, 1911). It probably does *not* remain to breed in Mesopotamia. Northward it is known to nest in Transcaspia (Radde and Walter, 1889; Molčanov, 1912; Zarudny, 1886, 1889–90) and throughout Turkestan, excepting possibly the **Caucasus** **Asia Minor** **Egypt** **Armenia** **Persia** **Transcaspia** **Turkestan**

southwestern part (Dresser, 1876). It nests also in the whole Kirgis region (Suschkin, 1900, 1914; Nazarow, 1887) and very likely in Orenburg. It is at present impossible to fix accurately the northern limit of the breeding range in western Siberia. Finsch (1879) says he did not see the Mallard on the Obi below its junction with the Irtysh, and he states that at Narimskaia it was looked upon as a curiosity. Yet a recent writer (Ushakov, 1913) says it breeds commonly in the Tobolsk Government. It seems that 61° or 62° north latitude would fix fairly accurately the northern limit in this region. In central Asia, however, it was found common on the steppes about Semipalatinsk, on the Marka-kul and on the Irtysh below Buchtarminsk (Finsch, 1879), as well as in Akmolinsk (Bianchi, 1902), Minussinsk, the Sajan Mountains, Russian Altai and on the Saissan-nor (Suschkin, 1913). It is said to be common at Tomsk (P. and J. Zalesski, 1915) and to extend on the Jenesei north to 60° north latitude (Popham, 1898; Seebohm, 1880). Southward the range includes undoubtedly the Tian-shan, whence the species has been recorded for Baimgol (Lönnberg, 1905), the Naryn Valley (Laubmann, 1913) and Baltistan (Richmond, 1896). Still farther south this duck nests in Yarkand and Kashgaria (Scully, 1876; R. B. Sharpe, 1891; Koslov, 1899) and Kashmir (Brooks, *fide* Dresser, 1871–81; Jerdon, 1864; Baker, 1908, Hume and Marshall, 1879). Very probably some breed in select localities throughout the Himalayas and on the lakes of southern Tibet (Walton, 1906). It is not likely that it nests in the deserts of central Tibet, but it does breed in northern Tibet and on the Lob-nor (Koslov, 1899).

Central Asia
Western Siberia
Central Asia
Eastern Turkestan
Tibet

In Mongolia the species evidently breeds in all suitable localities, especially in the valley of the Hoang-ho (Prjevalski, 1878) and in Shen-si (Sowerby, 1912). I am unable to give a definite limit for the southern extent of breeding in western China, but see no reason why the species should not nest in the mountainous regions south to 25° north latitude. At any rate it breeds in Manchuria (Ingram, 1909; Kuroda, 1918), and in Korea (Taczanowski, 1887, 1888). Apparently it is only a very rare breeder in Japan proper (Hondo), so Mr. Kuroda writes.

Mongolia
China
Manchuria
Korea

The Mallard breeds in eastern Siberia, but only in the southern parts, perhaps never going farther north than 65° north latitude. Bunge (1883) has recorded it from Irkutsk and the upper Lena and Taczanowski (1874) says it is common in Transbaikalia. Hall saw it one hundred miles above Yakutsk in June (Hartert, 1904). Buturlin (1908) considers the Verchojansk Mountains as the northern limit on the Lena, basing this perhaps on the fact that Maak (1859) met with the species on the Wiljui. A. von Middendorff (1853) found it breeding throughout the Stanowoi Mountains and on the south coast of the Sea of Okhotsk, while Radde (1863) met with it everywhere on the upper and middle Amur, and von Schrenck (1859) found it particularly common at the mouth of that river. In the Ussuri country it is equally common (Dörries, 1888) and has been described as the most abundant breeding duck in that region (Prjevalski, 1878). On Sakhalin also the Mallard has been found breeding (Lönnberg, 1908, Hesse, 1915; Thayer and Bangs, 1916). It nests on the Kuriles and sparingly on Yezo (Blakiston and Pryer, 1882; Kuroda, *in litt.*), and Mr. Kuroda writes me that downy young were obtained in Kamchatka in June and July, 1918. Since it winters there quite commonly, it may be a common nester, especially since it breeds not infrequently on Bering Island (Stejneger, 1885; Bianchi, 1909; Clark, 1910). I am unable to fix the northern limit of the breeding area in extreme eastern Siberia, but it is not found on the Arctic coast in that region (Nelson, 1883), and very likely not north of 61° or 62° north latitude.

Eastern Siberia
Sakhalin
Kuriles
Yezo
Kamchatka

Winter Range

The breeding and wintering areas of the Mallard coincide to a remarkably great extent. In the New World the species winters commonly on the Aleutians, at least on Attu (L. M. Turner, 1886) and on Unalaska (Nelson, 1887; L. M. Turner, 1886; Dall, 1873, 1874). It

Aleutian Islands

winters in central Alaska in the region about Mt. McKinley (Sheldon, Auk, vol. 26, p. 67, 1909), and at Sitka. According to Kermode (1904) and A. Brooks (1917) it is abundant in British Columbia and in Vancouver (Taverner, 1917). The same is true of the Pacific coast of the United States, where it winters in Washington (W. L. Dawson and Bowles, 1909), Oregon (Bendire, 1877; Pope, 1895–96) and the whole of California (Grinnell, Bryant and Storer, 1918). Eastward it winters in Idaho (Rust, 1915) and presumably in Nevada. A. A. Saunders (1921) says that some winter in Montana, while Grave and Walker (1913) and W. C. Knight (1902) record its wintering in Wyoming, and I have been informed of this for the Jackson Hole country in the northwestern part. It is undoubtedly to be found in Utah, and is common in winter in Colorado (W. L. Sclater, 1912), in southern Arizona (Swarth, 1914) and presumably in New Mexico. East of the 105th meridian (west longitude) the northern wintering limit runs farther south. I find no records of its wintering in the Dakotas, though it may be found in parts of South Dakota in winter. It has wintered at Lake City, Minnesota (Estes, 1877) and is known as a regular winter bird in Nebraska (Bruner, Wolcott and Swenk, 1905). Some numbers winter in Kansas (Bunker, 1913; H. Harris, 1919), Arkansas (Howell, 1911) and in Missouri (Widmann, 1907; Howell, U.S. Biological Survey, MS.). Some unquestionably winter in parts of Iowa also. East of the Mississippi the species winters north to southern Wisconsin (Kumlien and Hollister, 1903), and has been recorded from Illinois by Ridgway (1895) and Woodruff (1907). A. W. Butler (1898) states that it winters also in Indiana, while Barrows (1912) thinks a few may winter even in southern Michigan. Keeler (1888) has recorded its wintering in Milwaukee County of the last-named State. According to W. L. Dawson (1903) it winters occasionally in Ohio, and I presume it does so in parts of Pennsylvania, for it winters in western New York (Eaton, 1901). In New England the species has been known to winter rarely in all of the States excepting Vermont and New Hampshire, and it has been recorded by Sage, Bishop and Bliss (1913) as being commoner now than formerly in Connecticut. In Rhode Island it winters uncommonly (Howe and Sturtevant, 1899) and in Massachusetts it is very rare in winter (Howe and Allen, 1901). Both O. W. Knight (1908) and G. M. Allen (1909) state that it occurs rarely in Maine, according to the former, along the entire coast. Cooke (1906) states that it is accidental in winter even in Nova Scotia. South of New England in the coastal States it occurs rarely but regularly in New Jersey (W. Stone, 1909), Delaware (Rhoads and Pennock, 1905), Maryland (G. Eifrig, 1904), Virginia (H. H. Bailey, 1913), North Carolina (Pearson, Brimley and Brimley, 1919), South Carolina (Wayne, 1910), in Georgia and in Florida south at least to Caloosahatchie (Scott, 1892; Cory, 1896); but it is not really abundant on the coast except south of the Chesapeake. In Alabama the species is common (Golsan and Holt, 1914) and also in all the States of the lower Mississippi Valley, namely Kentucky, Tennessee and Mississippi on the east and Arkansas and Louisiana on the west side, this region forming the greatest wintering district of the species in the New World (Cooke, 1906; Kopman, 1921; etc.). In Texas also it is common (Beckham, 1888; Dresser, 1866; McCauley, 1877; Strecker, 1912), as it is in Oklahoma (Cooke, 1914). In Mexico it winters from the border south to about 19° or 20° north latitude in the east, and a little farther south in the west. Both Belding (1883) and Ridgway (*fide* Brewster, 1902) have recorded it from Lower California, Kennerly (*fide* Baird, Brewer and Ridgway, 1884) and Ferrari-Perez (1886) from Sonora, Lawrence (1874) from Mazatlan, Sinaloa, Cooke (1906) from Colima, Herrera (1888), Lawrence (1875), Sanchez (1877–78) from the Valle de Mexico, Dugés (1869) and Beebe (1905) from Jalisco and Guanajuato, Sclater and Salvin (1876) from Jalapa, Vera Cruz. It has evidently occurred in Guatemala (J. J. Rodriguez, 1909 10) and at El Boquete, Lake Nicaragua, great flocks have been seen (Rendahl, 1919). Cooke (1906) says there is a record for Costa Rica, though Carriker (1910) makes no reference to it. The fact that M'Leannan (Sclater and Salvin, 1864) found it in Panama must be regarded as unusual, and the same is true of de Armas's (1893)

Alaska

British Columbia

United States: Western

Central

Eastern

Nova Scotia

Southern United States

Mexico

Panama

record for Colon. Jewel (1913) says the only record for Panama is one for Miraflores. W. Stone (1918) includes the species in his list of the birds of the Canal Zone. In the Pacific the species

Hawaiian Islands

has occurred as a straggler in the Hawaiian group on Oahu and Molokai, and once also on Laysan Island (Schauinsland, 1899). The status of the species in the West

West Indies

Indies is not yet clear. In the Bahamas, where it has been found on New Providence, it appears to be regular in its occurrence (Cory, 1890; Riley, 1905) and even common (H. Bryant, 1859). There is one record of the occurrence of a flock in Cuba, on Lake Cardenas (Gundlach, 1875), while in Jamaica it appears to be accidental in winter (March, 1864; Bangs and Kennard, 1920). In the Lesser Antilles it occurs on Guadeloupe, according to an old record of l'Herminier's (Lawrence, 1879), as well as on the Grenadines, — St. Vincent, Mustique, Carriacou and Grenada (Wells, 1902; Clark, 1905). It is also known as a straggler in Bermuda (J. M. Jones, 1859; von Martens, 1859; Reid, 1884).

In southern Greenland, where the species is resident, it winters very commonly at Ivigtut (Hag-

Greenland

erup, 1891) and on the west coast probably north to Godthaab (Winge, 1899) while on the east coast Helms's (1910) dates would seem to indicate that it winters north to Angmagsalik.

In Iceland practically all of the breeding birds winter, that is, the species is really resident there

Iceland

(Hantzsch, 1905). The species is resident also on the Faroes (Müller, 1869) and

Faroes

winters commonly on the Shetlands (Saxby, 1874; Evans and Buckley, 1899), and

Shetlands

on the Orkneys (Buckley and Harvie-Brown, 1891). Throughout the British Isles

Orkneys

it is abundant in the cold season, being if anything, commoner than in summer (Dresser, 1871–81; Seebohm, 1885; Ussher and Warren, 1900; Witherby *et al.*, 1919–22;

British Isles

etc.). On the Continent it winters in Norway south of Trondhjem Fjord (Collett, 1871;

Norway

Schaanning, 1913), and in Sweden is very common in the cold season on the coasts of

Sweden

the middle and southern parts (Wallengren, 1854; Nilsson, 1858). It is presumably

Denmark

common in winter in Denmark (Helms, 1905) as it is in Holland (Schlegel, 1859) and

Holland

in Belgium (Dubois, 1912; Raspail, 1913). Dresser (1871–81) speaks of it as common

Belgium

in winter in France, but it is probably found chiefly in the coastal regions, about Tours

France

(Martin, 1887), in Anjou (Rogeron, 1903), at Perpignan (Backhouse, 1887) and particularly in Provence (l'Hermitte, 1916; Griscom, 1921). The Pyrenean Peninsula

Spain

seems to be one of the great wintering resorts of the species. According to A. C. Smith

Portugal

(1868), Tait (1887) and de Seabra (1910) it is common in Portugal. H. Saunders (1884) found it on the Lac de Lourdes, in the Pyrenees; and throughout Spain it is abundant in the cold season (Reyes y Prosper, 1886; Arévalo y Baca, 1887; Vayreda y Vila, 1883; Seone, *fide* Reyes y Prosper, 1886; H. Saunders, 1871; A. Chapman, 1888; Aldaz y Amazabel, 1918; *et al.*). Godman

Azores

(1866) states that it winters throughout the Azores. According to Barcelo it winters

Italy

on the Balearics, as it does also in Corsica (Jourdain, 1911; J. Whitehead, 1885)

Sardinia

and in Sardinia (Salvadori, 1865; Brooke, 1873; Giglioli, 1889–91). It is very common in Sicily (Malherbe, 1843; Giglioli, 1889–91), and in Malta it is not particularly rare (C. A. Wright, 1864; Despott, 1917). Giglioli's (1889–91) investigations in Italy show that the species winters throughout the Peninsula, from Calabria in the south, northward to Piedmont. It

Switzerland

winters also in suitable localities throughout Switzerland (Fatio, 1904), and in western

Germany

districts of the former German Empire, specifically in Lorraine (d'Hamonville, 1895), the Rhine Palatinate (W. and T. Heussler, 1896), the Rhine Provinces (Le Roi, 1906–07), in Brunswick (R. Blasius, 1896), southern Saxony (Heyder, 1913) and Mecklenburg (Wüstnei,

Luxembourg

1902). La Fontaine (1865–72) states that it is resident in Luxembourg. In the

Austria-Hungary

former Austro-Hungarian Empire, it winters in Bohemia (Fritsch, 1872) and in the Tyrol (Althammer, 1857), but particularly commonly in Dalmatia (Kolombatovič, 1903; Kollibay, 1904). A few winter in Hungary also (Hung. Ornith. Club). Through-

out the Balkans the species is abundant in winter, specifically in Montenegro (Reiser and Führer, 1896), in Greece (von der Mühle, 1844; Krüper, 1862; Lindermayer, 1860; Reiser, 1905), on the Cyclades (Erhard, 1858), in Epirus and Albania (Powys, 1860; Lilford, *fide* Dresser, 1871–81; Sperling, *fide* Dresser, 1871–81), in Macedonia (Elwes and Buckley, 1870; Sladen, 1917), at Constantinople (Braun, 1908), and in Bessarabia (Radakoff, 1881). The species winters also in the former Russian Empire, in Poland (Taczanowski, 1888; Katin, 1912), sparingly at Petrograd (Büchner, 1887; Deditius, 1885; Bianchi, 1907), rarely in Esthonia and Livonia (Loudon, 1909), and likewise in Novgorod (Bianchi, 1910), Pskov (Zarudny, 1910), Kazan (Russki, 1893), Moscow (Menzbier, 1881, 1883; Lorenz, 1892), Orel (Daniloff, 1864), southern Russia (von Nordmann, 1840; Valkh, 1911; von Zedlitz, 1917) and the Crimea (Radde, 1854). In the Caucasus the species is resident (Radde, 1884; Seebohm, 1882).

Balkans

Poland

Russia

Caucasus

In Africa the species is found in winter not rarely in the west as far south as the Canaries, where it appears regularly in the cold season (Meade-Waldo, 1893; Cabrera y Diaz, 1893–94; Bolle, 1857; Bannerman, 1919) and the Madeiras (Harcourt, 1851; Godman, 1866). On the mainland it is abundant in Morocco (Carstensen, 1852; Irby, 1875; Drake, 1867; S. G. Reid, 1885; H. and A. Vaucher, 1915), and in Algeria (Loche, 1867; Rothschild and Hartert, 1912; Menegaux, 1919) where it extends south to the Atlas (Salvin, 1859) and the northern Sahara (Tristram, 1860). Schweppenburg (1918) found feathers of the Mallard in the Tuareg region of the Sahara, and states that Foureau took specimens in Ain Taiba and near In-Azaoua (21° north latitude). It is probably less abundant in Tunis, but nevertheless is common there (Talamon, 1904; König, 1888; Whitaker, 1905). In Egypt the species is abundant in the Delta (von Heuglin, 1873; Shelley, 1872), not common, however, at Giza (Nicoll, 1909) where of course it is much persecuted, but it occurs in Nubia (Shelley, 1872; A. L. Adams, 1864) and according to Rüppell (1845), even in Abyssinia. This last statement is insufficiently proved. It seems not to winter on the White Nile, and I did not see it in the eastern Sudan. A. Chapman (1921) quotes Captain Burges, who says that in many years' shooting near Khartum he killed only one Mallard and heard of another taken near Shendi, fifty miles farther north. The species has been met with on Socotra Island (Tristram, 1898) and at Aden (Barnes, 1893; Yerbury, *fide* Reichenow, 1900). Von Heuglin (1873) states that it is found at Suez and that he met with it once in Arabia Petræa.

Canary Islands

Morocco

Algeria

Tunis

Egypt

Abyssinia

In Asia the species was said by Tristram (1884) to be common in winter in Palestine but a more recent author (Meinertzhagen, 1920) describes it as rare. On Cyprus (Lilford, 1889; Bucknill, 1910) as well as in various parts of Asia Minor, it is plentiful. For example, Danford (1878, 1880) found it in "swarms" in the Taurus region, and met with a few on the Cilician Range. Weigold (1913) has recorded it from the Meander River, and Strickland (1836) from Smyrna. The species very likely winters throughout the interior as well as on the coast of the Black Sea. Meinertzhagen (1914) and Stoneham (1919) describe it as common in Mesopotamia. It has been taken at Fao, at the head of the Persian Gulf (Sharpe, 1891) and Zarudny (1911) states that it winters in Persia in the Mesopotamian and Zagross regions, as well as in Kuhistan, Kirman, the Seistan, Parapamis, Chorassan and south Caspian districts. Radde (1886) states that it is common on the southwest Caspian in winter, and it winters also in Transcaspia (Radde and Walter, 1889; Stolzmann, 1893) and in Bokhara (Carruthers, 1910). According to O. B. St. John (1889) it is a common winter bird in southern Afghanistan, and according to Zarudny (1911), in northern Baluchistan. Meinertzhagen (1920) has recorded it for Quetta, and C. H. T. Whitehead (1909) says it is common in Kohat and Kurram. To the north of Persia it winters all over Turkestan (Dresser, 1876), most likely also in Astrakhan, and at least in part of the Kirgis. Owing to lack of sufficient information it is impossible to define its northern wintering limit in western Siberia. Travellers have reported open water with "ducks"

Persia

Transcaspia

Turkestan

Central Asia

West Siberia

in Mongolia in midwinter and I see no reason why the species should not winter in suitable localities in Asia, north to the latitude of Lake Baikal. According to Pallas (1831) it does winter on the Angara River. Radde (1863) was, however, unable to reaffirm this observation, and on the whole it seems advisable to limit the statement of range somewhat, if only for the sake of conservatism. I believe that a line drawn from Kazan, Russia, southeast to Lake Issykkul will define the northern wintering limit in this region. It has been met with in the Tian-shan in various localities west to east (Lönnberg, 1905; Schalow, 1901, 1908; Pleske, 1892; Laubmann, 1913) and according to Koslov (1899) it winters in the Lake Bagrasch-kul district, as well as in the mountains of northern Tibet, where Prjevalski (1878) also found it wintering on the Tsaidam swamps. In other words, the evidence indicates that the birds winter in central Asia south of a line drawn from the Tian-shan, eastward along the 42d and 43d parallels of latitude. South of the Tian-shan the species winters abundantly in Kashgaria and Yarkand (Scully, 1876; Koslov, 1899), and in Kashmir, where it is resident (Scully, 1881; Hume and Marshall, 1879; Baker, 1908; Blanford, 1898). There is considerable doubt as to its status in India, where it is common in winter in the northwestern districts, but rare in the central and eastern parts, being totally lacking in the southern regions and in Ceylon. Blanford's (1898) résumé covers the situation fairly well. He says it is common in the western Punjab and Sind, not uncommon in the northwest Provinces, Oudh, and Behar, and of occasional occurrence in Guzerat, the Central Indian Agency, the Deccan (presumably only the northern part), Bengal and northern Burma. To this may be added the more detailed statements of Hume and Marshall (1879) that it is not uncommon in Kumaon and Nepal, but rare in the west in Cutch, Kathiawar and southern Bombay. Baker's (1921) investigations have made its status in the eastern parts more definite. After stating that a few have been taken in Rajputana and northern Bombay as well as in the Central Provinces, he goes on to say that it occurs in Assam and Jessore. He found it not very rare in Cachar, and states that it has occurred in Sylhet. There are only three records for Manipur, and but two for Burma, one of them as far south as Mandalay! Passing eastward to southern China the species has been taken in Yunnan (Ingram, 1912; R. C. and Y. B. Andrews, 1918; H. R. Davies, 1909) and I am inclined to think that north of the Malay Peninsula the species winters not much south of the Tropic of Cancer. A duck described as *Anas salvadorii* from the Island of Sumba is a domestic Mallard (Büttikofer, 1896). Throughout China it is apparently abundant (David and Oustalet, 1877), and has been recorded specifically from Formosa (R. Swinhoe, 1863; Uchida, 1912) and Amoy (R. Swinhoe, 1860; Vaughan and Jones, 1913), from Foochow and Swatow (La Touche, 1892), from Kiauchow (Kleinschmidt, 1913) from Wei-hai-wei (K. H. Jones, 1911), and from Ningpo and Peking (R. Swinhoe, 1861; Walton, 1903; Blackwelder, 1907). In the interior it was found at Kin-kiang (Seebohm, 1884) and in Hupeh (Thayer and Bangs, 1912; La Touche, 1922). It was met with by E. H. Wilson (1913) at Kiating, Szechwan Province, and Thayer and Bangs have also recorded it from this region. Both Deditius (1886) and Berezowski and Bianchi (1891) have reported it from Kan-su Province, where it is apparently common. Sowerby (1912) met with it north of Hsinan Fu. According to Ogawa (1905) it has been taken on the Loo-choo Islands, namely, on Omami-Oshima and on Tanegashima, being pretty common on the former island. The species is very common in southern Japan (Blakiston and Pryer, 1882; Seebohm, 1890) extending north throughout Yezo and on the Kuriles, wherever there may be suitable localities. On the mainland it winters in Korea (Taczanowski, 1887, 1888) and in small numbers in the Ussuri region (Dörries, 1888) as well as on the coasts of the Japanese Sea (Prjevalski, 1878). Nikolski (*fide* Taczanowski, 1893) states that it winters in the southern parts of Saghalin Island, and von Schrenck (1859) extends this to include the central portion. Long ago Pallas (1831) and recently von Ditmar (1900) recorded its wintering in Kamchatka, probably in the southern part, and this statement seems not unlikely in view of the fact that the species is

Asia

Eastern Turkestan

Tibet

India

Southern China

China

Japan
Yezo
Kuriles
Korea

Saghalin

Kamchatka

resident on Bering Island, though rare in winter (Stejneger, 1885; Bianchi, 1909). It may be well to mention here that according to Moulton's (1914) catalogue there is a specimen in the Sarawak Museum in Borneo, coming from that island. This is the only record I find for the West Indies. Borneo

Migration

One approaches this subject with the greatest hesitation, because it is so difficult to write any comprehensive story of the seasonal movements of so cosmopolitan a species. Besides, we have to admit that we know almost nothing about the extent of territory which the individual covers; and the more records of banded ducks we get, the more complicated does the problem become. I propose, therefore, to outline seasonal movements, and then apply them to the various parts of the Mallard's range.

This duck undoubtedly becomes resident wherever it can maintain itself throughout the year. The Greenland Mallard, which is fairly distinct, forms a group entirely isolated. The Iceland Mallard is not so distinct, and is certainly not an absolutely isolated group. Groups, apparently strictly resident, occur in many other places, but they have produced no local varieties.

In Mallards, as in probably all our northern river ducks, the males leave the female during incubation, mostly well before the young are hatched. These males may make a considerable excursion to some safe retreat, where they congregate and moult. How far these males may travel after they have moulted, and before there is any southward movement, we do not know, but we suspect from records of banded birds at Bear River in Utah and from other sources, that there may be considerable summer flights, very likely in a northerly direction. The young birds may even participate in such flights. However that may be, there is need of very intensive banding of both young and old birds in many different localities, besides observation on banded birds where they may be frequently trapped to see how long the individual tarries in one place. In all places where a definite migration takes place, the females and young of the year move before the old males. This is borne out by many scattered observations such as those of Leopold (1919a) and Hollister (1920a) for the autumn migration, and it also applies to the winter distribution. Not only do the males migrate in general later, but they stay farther north. Major Allan Brooks made some interesting sex counts of large numbers of various ducks at Comox, British Columbia, and he tells me that about the 10th of February there were three males to one female Mallard, but the last of the month, with others arriving from the south, the sexes were nearly equal. As the same phenomenon was seen in various other species it no doubt points to some general principle, the value of which to the species it is difficult to imagine. Some time during the beginning of migration the sexes must become approximately even, for final pairing takes place at that time, and large bodies of ducks can be easily seen to be made up of pairs, as soon as they settle and begin to feed.

In North America, we have a large passage area, that is, an area over which very few birds either breed or winter; and this is formed by the north-central and northeastern States with parts of Ontario. Colorado, Nebraska, Kansas, Iowa, Missouri, Wisconsin, Illinois, Indiana, Ohio, Michigan, Pennsylvania, New Jersey and New York are chiefly passage areas, but more ducks breed there now than before spring shooting was stopped. The great bulk of Mallards are bred in the north and west, and these winter in large part on the Gulf coast. Many, however, head southeastward instead of south, and just touch southern New England *en route*, distributing themselves all the way from Long Island Sound to Florida, becoming more plentiful as one approaches South Carolina. Now the Mallards that take this journey do not stay very long on the Atlantic coast, but work their way south, so that after January 1st, the species is rare at Currituck, North Carolina, and after February 1st, practically absent. These ducks must work back to their breeding grounds over a different route, for they are not present on the North Atlantic coast in spring. Cook apparently did not believe that such elliptical journeys were performed by any of our *Anatidæ* except the Brant, but I

must say that I believe the spring route is different from the autumn route in several of the western breeding species that come to our east coast. A number of wild Mallards which were trapped for me at Avery Isle, Louisiana, were liberated at Wenham, Massachusetts, in the summer of 1917, and these were shot all the way down the coast, the following autumn, to near their former station in Louisiana, and finally two were taken, back at their breeding ground in North Dakota and Alberta. Mallards tagged by Jack Miner in Kingsville, Ontario, did not apparently go to the Atlantic coast, as one would expect, but were shot at Ravenswood, West Virginia; Greenwood, Ohio; Martha, Tennessee; two in Kentucky; one in Bakersville, Missouri, and one in Indiana, besides one in Gueydan, Louisiana. I do not know the dates of these records. Many Mallards banded at Port Perry, Ontario, north of Lake Ontario, in early autumn flew down the Ohio and Mississippi valleys to the Gulf coast, and also across to the Atlantic coast, where they were taken from Virginia to Florida. Others trapped in Louisiana and released at Ithaca, New York, showed the same tendency that my own did, namely, to return to Louisiana and later to a northwestern breeding area. They could not be lured away from their original migration route simply by transportation. This fact is of some importance in any attempt to introduce Mallards.

In the last year or two a very large number of Mallards have been banded near Browning, Illinois, on the Sanganois Club grounds and also at Cuivre Isle, near Peruque, Missouri (U.S.B.S. records). Many hundreds of these birds have already been shot, most of them the first year after banding, and these will eventually tell an interesting story. For instance we will know the exact breeding ground of certain groups, their east and west dispersal, their winter quarters, the length of time spent in migrating and the per cent of artificial mortality they are subjected to *en route*. One can already see that these ducks tend to tarry for a long time in the upper Mississippi Valley before seeking the Gulf coast, that they follow a well-defined route from southern Saskatchewan, Manitoba and the Dakotas to southern Louisiana and Mississippi, and that in places twenty per cent are shot before they get far away from the trapping station.

Out of 72 adults banded at Bear River, Utah, in September, 1914–15 and 1916, there were 22 returns (Wetmore, MS.). These extend as far west as central California and as far east as Texas, southeastern Idaho and other points.

Now as to dates of migration there is nothing very unusual about the Mallard. It is not an early autumn migrant, being well behind the Pintail, Shoveller and Blue-winged Teal, but on the way north it takes advantage of every bit of open water and arrives with the first ducks pushing up the Mississippi Valley. During autumn the species straggles very rarely to Newfoundland (J. and J. M. Macoun, 1909) and there are a few records for Labrador, namely, Davis Inlet and the mouth of the Koksoak, and Fort Chimo (Packard, 1891) and Okak (Hantzsch, 1908).

Enumeration of dates of arrival and departure would be tedious, and they are well summed up by Cooke (1906). The northern States are reached in the second half of September. The birds become plentiful two or three weeks later and stay until frozen out. They reach Texas and the southern States in the first half of October, but increase in numbers for a month at least. McIlhenny (1916) mentions a specimen, which, transported in winter from the Gulf coast of Louisiana to Wisconsin, was tagged there and the very next winter was taken at the same place in Louisiana. Those Mallards breeding in Alaska and on the North Pacific coast probably do not, as individuals, move far to the south, on account of the more uniform winters, but great numbers visit the interior valleys of California, and the mouth of the Colorado River. The migration is of course somewhat later on the Pacific coast. A few stragglers, probably from the Alaskan peninsula or the Aleutian Islands, reach the Hawaiian Islands.

In western Europe the Mallard tends to become almost sedentary: but northern-bred groups arrive in the winter to join the local birds. Of course much of the breeding stock has been extirpated, but originally there must have been stationary, or nearly stationary groups everywhere, with little territory, except in the far north, that could be termed strictly a passage area. In general European Mal-

lards do not migrate as far as Teals or Pintails, usually not over 50 or 100 miles. Returns from many banded Mallards in England show how extremely local the home-bred stock is. These records are summed up in the reports of the British marking experiments in British Birds. A note by Poncins (1917) has brought out the same facts, and he considers the Mallards reared in France just as local as the English ones. To show how very local the British stock is we might note that of 80 ringed as nestlings and afterwards recovered, only two were reported outside of England. One of these was from Danzig, east Prussia, and the other from Nord, France. Part of this lot were hand-reared birds, but this seemed to make little or no difference in their ultimate distribution. They belonged to an extremely sedentary group.

With adult Mallards banded in England between September and March (mostly in February) the results are different as we should expect. Out of 60 ringed in Wigtownshire, 52 were recovered at home and 8 away from home, in various localities, including Ireland, the Faroes, Finland, Sweden, Friesland, and Swedish Lapland (British Birds). Adult Mallards banded in Holland, mostly in the spring (April), show a great many local records but some from Germany, Sweden, Denmark, Finland, etc. (van Oort, Ardea, vols. 1–4, 1912–1915; see recent summary by Thomson, 1923).

Mallards that breed farther north, in Kurland, were shown by Thienemann (1915) to have taken a course southwesterly along the coast, one covering a distance of 1400 kilometers to Belgium, and one 1600 kilometers to Plancy, northern France. Another young of the year banded in eastern Prussia, was taken the following March near Olmütz, Moravia, a distance of 570 kilometers south-southwest, but it may have been on its way north by an inland route. Others showed a tendency to return to their birthplace. These records are interesting because they show a probable northeast to southwest trend for migrants from Scandinavia and the Baltic lands. Moreover, although the British Mallards that have been banded were mostly the local breeding stock, there are a few that show an interchange with Danzig, east Prussia, France, and Swedish Lapland. One marked in Finland was shot in Scotland the same year (London Field, vol. 129, p. 112, 1917).

Now it is interesting to note that a group of much smaller Mallards which arrive at the British Isles in winter and seem to prefer the coast, have long been recognized by sportsmen and professional gunners. They are said to weigh very much less than the home-bred ducks and are usually under two pounds. So great is the difference in size that a smaller price is paid for them in the markets. Very likely this difference in weight is due to poorer living conditions in their northern home, or later nesting, but some observers in the British Isles are inclined to consider these "foreign" birds as a distinctly smaller Scandinavian race with a wing of only 270–273 mm. (A. Chapman, 1889; Smalley, 1919; Beveridge, 1919). However, a small Scandinavian race was not found by Hartert (1920) so perhaps these birds are from Iceland. The home-bred British birds were thought by Payne-Gallwey (1886) to suffer more from frost than the small northern ducks. I feel sure that there is something significant about all these reports, for in the Mississippi Valley intelligent sportsmen recognize a very late flight of small Mallards which have even been given local names, such as Frosty-bills, Snow Mallards, Ice-breakers, etc. The banding of some of these might bring interesting results.

In western Europe the migration is later in the autumn and earlier in the spring than in North America, and it may be found that in spring, birds return by a more inland route. In Asia, where extremes of climate are much greater, and there are large central deserts, we find a more pronounced passage area, and a much greater north to south excursion. Prjevalski (Deditius, 1886) found the species migrating across the deserts of northern Tibet in great numbers. The dates of arrival and departure do not differ greatly from those found in the interior of North America. In the north, migration starts early and ends early; in the south it begins late and ends late. We really do not know anything about the direction of migration routes in different parts of Asia, but since the central parts are so cut up with mountains, deserts and inland seas, with very irregular river systems, we must assume that the picture is a very complicated one. Although there must be nearly sedentary

groups established here and there, particularly in the southern parts of the range, these groups are swelled during the winter by far-northern migrants, or themselves move short distances to make way for their northern brothers.

GENERAL HABITS

In discussing the habits of the Mallard, one inevitably includes the life-history of most of the surface-feeding ducks (*Anatinæ*) of the northern hemisphere, for all members of the genus *Anas* are, biologically speaking, remarkably similar. The present species is not only one of the most abundant, but it is also one of the most widely distributed of all birds. In consequence, the literature is almost endless, and includes the whole subject of duck-shooting in all ages, and over half the surface of the globe. Obviously, then, nothing short of a monograph could do the subject justice, and I must here confine myself to a brief and condensed survey.

Haunts. A glance at the map will show that the Mallard flourishes in an infinite variety of country, a fact which results in very diverse habits in different regions. Its most important characteristic is doubtless a wonderful adaptability, both physical and psychological. The first not only enables it to brave the arctic winters of Greenland, but also the no less trying conditions on summer breeding grounds in Mediterranean lands and in our own Southwest. The second trait leads it to take immediate advantage of the presence of man, and no duck becomes tame more rapidly where protection is extended. Perhaps most interesting of all is that peculiar psychological complex, so rare in the animal kingdom, which lends itself to complete domestication, and this faculty is so pronounced that it removes this species from all comparison with other ducks except perhaps the Muscovy.

Broadly speaking the Mallard is a fresh-water species, preferring fresh or brackish marshes, shallow pools well stocked with water plants and animal life, and sluggish rivers bordered by reed beds. But it is not at all a particular bird, and can make its living in open or wooded, low or high country, wherever vegetable or animal food can be gleaned from the land or water. Locally, in northwestern Europe, it can and does manage to subsist on tidal flats and estuaries during periods of severe frost, or when persistently hunted, but such a practice is never more than temporary, and is given up just as soon as inland waters are available. Of course in many regions near the coast, the open sea is almost the only refuge for it during the day, and in such districts it sits out beyond the breakers all day if the weather be not too rough, flighting inland at dusk. Better than any other species, it manages to exist as a breeding duck in countries where the marshes have nearly all been reclaimed, as in England and other parts of western Europe.

The Mallard will stand extreme cold, and has become local on some of the open streams of southern Greenland, Iceland, Kamchatka and Alaska, where the temper-

ature drops to 40° below zero (Fahrenheit). In various localities it has been found wintering as well as breeding at high altitudes, — for example in our Rocky Mountains (where I have seen them apparently resident at 6000 feet), in Switzerland and in Kashmir.

Wariness. The Mallard is wild, and becomes increasingly so through persecution. But perhaps it should be called intelligent, rather than shy by nature. If left to itself on protected waters and in city parks it soon becomes so tame that it will allow passers-by to come within five or ten yards, just as our still more wary Black Duck does. Naumann (1896-1905) tells of certain individuals that were long protected in the German town of Cöthen, and which were accustomed to parade the streets and even fly from one street to the other. In this country many parks are frequented by thousands of ducks of this and other species who walk about the lawns in close proximity to busy driveways. Wherever it is regularly fed there is almost no limit to its sociability with man, but these same birds outside the protected area are just as wary as the rest of their kind. In wilder countries where birds are less persecuted, Mallards are of course much tamer, but nowadays there are few regions within its range that do not echo to the sound of the cheap breech-loader. Where suitable laws are enforced the summer season restores their confidence, but it is extraordinary how little time it takes to make them as wild as ever. Young birds on the breeding grounds, as I have seen them in our western States, are by no means shy, but the process of education proceeds very rapidly, more rapidly I should say, than with most ducks. To quote instances of the wisdom of the adult bird would be a waste of time, for every sportsman is but too well posted on this subject. Speaking from my own experience, especially as to their behavior when shot over live or artificial decoys, I am quite certain that they never equal either Pintail or Widgeon in correctly "sizing up" danger spots, or measuring the range of a gun. Neither do they ever, excepting perhaps in England, grow so completely nocturnal and almost un-get-at-able as our Red-legged Black Ducks (*Anas rubripes rubripes*). References to the tameness of the Mallard in various regions may be found scattered throughout the literature (Hantzsch, 1905; Hume and Marshall, 1879; Reiser, 1894), but these can all be explained by local conditions, or seasonal considerations.

Daily Movements. Like all true ducks, the Mallards, before the advent of man, probably fed almost entirely by day, seeking small sheltered pools on which to spend the night. But now all this is changed. If left alone during the summer they feed in their sheltered haunts throughout the day, but the more they are shot at, the more they take to large open sheets of water to spend the daylight hours, coming in to the grain-fields or smaller marshes after sunset. During migration ducks cannot

become entirely nocturnal, and their habits in this respect are not fully developed until they become localized on their wintering grounds. As a rule the later the season, the less they feed by day. The time of the evening flight is largely governed by the weather, and the condition of the bird's crop. On dark stormy evenings, after Mallards have been subjected all day to wind and wave, they, like other ducks, will seek food and shelter much earlier, even though they are being constantly shot at. They feed readily on dark nights but even better on moonlight ones, at which times, if they are very shy, they do not flight until long after dark, especially if the evening is calm and clear. But it is very rare to find the Mallard exclusively nocturnal in any sort of locality. Where it inhabits large tracts of marsh by no means all of the birds desert the feeding ground during the day. There are always some individuals whose actions are governed by their stomachs rather than by their heads.

At Currituck Sound, on the coast of North Carolina, where ducks are not completely nocturnal in their habits, there are on fair winter days flights to the sea by the more wary birds, as soon as a gun is fired or a boat pushed about the marshes. Then there is a brief morning flight over the marsh which begins to slacken by eight or nine o'clock, after which, if the day be calm, scarcely a duck will move until early in the afternoon. It goes without saying that early in the shooting season, fewer ducks go to sea than later on. From about two o'clock in the afternoon, there is another movement of the ducks that have been resting in the marshes, to the favorite feeding grounds, but very few return from the sea unless a sudden change of wind forces them to seek shelter. This afternoon movement often ceases in an hour or two, after which there is a period till sundown when the marsh seems perfectly deserted. Hardly has the sun set, however, when the whole scene is changed to one of great animation: huge hosts of Mallards, Teals, Widgeons, and diving ducks come in from the sea, flying at a great height, but coming lower as the darkness increases, till finally the marshes are thickly populated with thousands of ducks, and great rafts of trumpeting swans and honking geese.

The bathing and playing periods, during which they indulge in all sorts of short splashing dives and flights, take place in the morning, after their crops are full, and before the resting period, during which they are often seen basking in the sun in some out-of-the-way nook or on banks. The play is most actively indulged in by young birds just acquiring their full plumage, before they have entirely lost their diving habits.

Migration is performed chiefly at night, but there is no hard-and-fast rule and under certain weather conditions, as yet imperfectly understood, ducks and geese may migrate all day and halt for the night.

Gait. In the pure wild species the walk is fast and elegant, though rather waddling in character. In specimens only one degree removed from the wild, the

carriage is more erect and the walk more waddling, while the whole bird has a coarser and heavier look, especially about the head and neck. The wild birds carry the body almost horizontally, as do Teals, Widgeons and other true ducks. The neck is carried well back on the body in a pronounced S-shaped curve.

Swimming and Diving. The Mallard is as active on the water as any other true duck. The swimming position is horizontal, the stern carried lower than in Sheldrakes or geese. A characteristic habit of the species is the tipping-up in the water, a position in which food can be obtained to a depth of a foot and a half. While feeding in this manner the body is kept in the perpendicular position by a movement of the feet. The Mallard is, of course, a surface, or shallow-water feeder and loses the habit of diving when about two-thirds grown. There are, however, numerous instances of adult Mallards diving for food, and when wounded, particularly when wing-broken, they can and will swim under water for long distances with only the head appearing above water between dives. Shallow, splashing dives are also practiced during play, this being seen at its best in young birds just reaching full plumage. They may then dive while swimming or from low altitudes during short flights, but they never remain submerged for more than a few seconds. When pursued by raptorial birds, even adult Mallards will sometimes dive from the wing, but if on the water, they assume a crouching attitude, or submerge themselves as far as the neck. Millais (1902) has admirably pictured this last practice in his monograph on the surface-feeding ducks of the British Isles. The female is said to be more of an adept both at diving and at hiding when crippled (Payne-Gallwey, 1882), but I cannot say that I have ever noticed much difference. Of course her color makes the hen bird much more difficult to see. Another time when adults may practice diving is during the moult in summer. Francis Harper writes me that he saw a male in full eclipse in the Athabasca region try to escape by diving. The bird was shot and proved to have shed its primaries. In diving when not wounded, the wings are often used, and I think they are also opened under water in play antics. Kelso (1913) thought that the wings were never used for propulsion under water but this cannot be the whole truth, and I am sure that very young birds spread the wing rudiments while diving. Dr. C. W. Townsend, who has paid particular attention to this point, says that, as far as he knows, Black Ducks (and this of course means Mallards too) resort to the primitive method of "scrambling" with their wings and feet when under water. Semi-domestic Mallards develop diving habits more readily than wild ones, and they have been observed bringing food from the bottom in four or five feet of water.

Perching. There are a few references to Mallards seen perching on trees. These are from central Europe, where it is not particularly rare to find them nesting in elevated situations. I myself have never seen them perching on anything higher than low rocks or submerged stumps.

Flight. The Mallard is a fast, though not the fastest duck on the wing, for it is certainly excelled by the Pintail, Hooded Merganser, and many diving ducks. Nevertheless, in mixed flocks, the Mallard shows no tendency to lag behind, and keeps in even, compact formations with Pintail, Widgeon, Gadwall, Teal and other species. It rises with a sharp upward spring, from either land or water, to a height of from ten to fifteen feet in open country, and to a much greater height within a wood. It then flies off on a long ascending plane. The females, it should be noted, always quack when flushed. The wing-beats are not very rapid, of course much less so than in diving ducks or mergansers, and with a long up-and-down excursion, which produces a sharp whistling sound, especially when heard during still frosty mornings. At such times, or on clear nights, the wings produce sounds almost as loud as those made by the Golden-eye. The wing-beats of the Mallard are slower than those of Teal, and it takes the larger duck much longer to pick up speed or change its course, but once on his way I do not think that the Teal can leave him behind. Sportsmen are inclined to give Teals credit for more speed than they actually possess, but it is really their low, twisting flight, the suddenness of their appearance and their small size, rather than their actual speed, which makes them so difficult to bring down. Unfortunately there are no really reliable figures as to the speed of the Mallard over a measured course. It has been variously estimated from as low as forty or fifty miles to one hundred and twenty miles per hour, which last figure Audubon considers within the range of possibility. Baird, Brewer and Ridgway (1884) compute its speed as hardly less than a hundred miles per hour. Personally I believe there is a tendency to exaggerate the speed at which they fly. I have many times seen Mallards and Black Ducks coming up wind during severe gales, when the velocity of the wind could not have been more than forty to fifty miles an hour, and at such times their progress was exceedingly slow, certainly not over five to ten miles per hour. I have even seen them unable to make any headway for many seconds at a time, but perhaps these birds, searching out sheltered places as they went, were not exerting their full strength. An estimate of the speed of a Pintail is quoted by G. B. Grinnell (1901). The observation was made from a train running at fifty-two miles an hour, and the Pintail could exceed this speed at will. Another note by C. St. John (1882) tells of a Peregrine Falcon who was unable to gain a yard on a Mallard during a long chase. Recently more careful tests of the speed of migrating ducks have been made (Meinertzhagen, 1921) and entirely contradict the wild guesses of early writers. In those tests the speed varied from 44 to 59 miles, and averaged around 50 miles. This does not differ greatly from the speed of migrating Canada Geese measured over a course by two meteorologists, Messrs. S. P. Ferguson and H. H. Clayton. Their conclusion was that a speed of only 45 miles was obtained at an altitude of from 900 to 1000 feet.

There is very little real information as to the maximum height at which ducks fly.

An observation made through a telescope against the moon showed a flock which was five miles away and three thousand feet high (Service, 1903). Judging from the height at which geese are often seen, and according to the numerous observations made by Gätke in Helgoland, much greater altitudes are often reached; but recent observers consider that Gätke overestimated the ordinary altitude of migrants. This subject was well summed up by Meinertzhagen (1921) who concluded that the bulk of the movement takes place below 3000 feet, mostly at night, and that anything above 5000 feet must be considered exceptional.

No duck is able to glide in the sense that a gull does, but they may scale downward for long distances with scarcely any wing movement. They can hover, as they often do over decoys, with a slight quivering of the wings. In alighting, they almost always head up wind, and at such times strike the water in a neat manner, without much splashing, particularly if there is a strong breeze. But if the wind is light or at their backs they are forced to rear up and "back pedal" with their wings, assuming extremely awkward positions which are best shown by instantaneous photographs. Ducks do, at times, alight by mistake on thin, clear ice, affording then an amusing sight, for they slide long distances and even turn somersaults before their headway is checked.

Mallards do not, as a rule, travel in very large flocks, certainly not in such aggregations as do Widgeons, Teals and Pintails. During the middle of the winter the flocks begin to break into pairs after they settle down to feed, and when single pairs are flying about, the female almost always leads. Flocks of twenty or thirty might be spoken of as typical, and although companies numbering thousands may be seen in favorite feeding areas, these invariably break up into smaller flocks when flushed. On migration they travel usually by night, though in severe weather they may often be seen migrating by day, or in clear weather before sunrise. On short flights about the feeding grounds there is no particular formation. Large numbers often straggle out in irregular clouds. On migration, however, though not frequently observing regular V- or arrow-shapes, they fall into orderly wedge-shaped flocks or long wavering slanting lines which change continuously. Such flocks seldom make a noise, though I have heard occasional low chuckling notes when they were near enough.

Identification of Mallards on the wing is usually easy. The large size and striking color-pattern of the male is evident at a long distance, but in poor light it is not possible to tell Mallards from Black Ducks. The light color and prominent wing-bars of the female make her conspicuous at even greater ranges. Both Mallards and Black Ducks have a wing "arc" which is rather characteristic; that is the wings (except when the bird is rising rapidly) are not depressed much below the level of the body.

Sense Organs. There seems to be a deep-rooted conviction among sportsmen

and professional gunners, that ducks, and particularly Mallards and Black Ducks, have a highly developed sense of smell. All I can say is that I have always sought for evidence on this point and never found any. I have often stood in a shooting stand, both in the daytime and at night, and allowed tobacco smoke to blow over ducks only a few yards away among the decoys, without their paying the least attention to it. I have seen hundreds of flocks of Black Ducks and Mallards swim directly up wind toward a shooting stand, and never could see that they were any more difficult to decoy under these conditions. All ducks are suspicious if there is flat calm water under a bank, and approach it cautiously. It is usually maintained that ducks will not fly up wind very close to a concealed gunner, but this peculiarity is probably due to their being afraid to approach black water under a bank, and to the fact that they see very much better when flying straight toward the shooter than when going broadside to him. Helm (in Naumann, 1896–1905) says he found no evidence of sense of smell in his twenty-five years' experience, although the elder Naumann was convinced of it.

Hearing. Mallards are as easily frightened by a noise as any species of duck. Certainly they are more difficult to stalk than diving ducks, Teals or Widgeons, but they are not usually as acute in this respect as the Black Ducks. When tipping up for food the Mallard is unable to hear anything, and this can easily be proved by running down upon ducks that have their heads under water.

Sight. Their powers of sight are in many respects very limited. During flight they do not notice even conspicuous objects unless these are in motion, but as soon as they have alighted, with upstretched neck and keen eye they take in all suspicious objects in a very few seconds, especially if there is the least movement. Ducks see very little at night, as any one must know who has sculled about in a ducking float on moonlight nights. In thick, misty or stormy weather all ducks lose much of their powers of vision, becoming tamer in every respect. An interesting faculty, which is well developed in the Mallard, but not so well as in the geese, is their ability to note very high-flying birds. Man sees little of what goes on directly above him, but if the shooter watches his Mallard decoy ducks he will often see them cock their heads slightly to one side, which always signifies the presence of a strange bird overhead, often so high that it is difficult to see. Millais (1902) thinks that the eyesight of all ducks and geese is far superior to that of man, but he doubts if Mallards have such extraordinary vision as do Widgeons or Brant Geese. It is quite evident that when looking straight up they can see objects which are invisible to man.

Touch. This highly developed sense will be discussed in connection with the feeding habits.

Association with other Species. In eastern North America the Mallard is commonly seen with the Black Duck during the winter months, and it associates less freely with Widgeon, Pintail and Teal, in fact with all other surface-feeding ducks. In the Old World its habits are similar, but Naumann (1896–1905) says it will not associate with geese, though it gets along well with swans. In the Ussuri region of eastern Siberia the Mallard was found chiefly with Pintail, Falcated Teal and Formosan Teal (Taczanowski, 1893), while at other times Teal were seen leading flocks of Mallards (Dörries, 1888). A few Mallard nests have been found which contained eggs of other species, but such instances are far less common than among diving ducks. Mallard and Teal eggs were found in the same nest in northeastern Montana (Willett, 1906), and in England a Mallard is known to have laid its eggs in a nest already occupied by a Coot (Baker, 1908). A nest mentioned by Thienemann (1903) contained eggs of both Mallard and Pochard. Another nest has been described in a tree containing nests of the Hooded Crow and the Great Reed Warbler (Lintia, 1909). Jardine (in A. Wilson, 1832) states that he once took a Wild Duck's nest on a knoll of heather which was within ten yards of the nest of a Peregrine Falcon, so that the tenants could not help seeing each other in passing to and from their nests. Wüstnei (1900) found some Mallards nesting with a colony of one hundred and fifty gulls, and von Mojsisovics (1886) met with others nesting in close proximity to a heron colony. In the British Isles a nest was found containing one Mallard's egg, eight Teal's eggs and various pheasants' eggs (W. G. Clarke, 1897). Barfod (Mitth. Naturwiss. Ver. Steiermark) tells of a Mallard nesting with a Marsh Hawk (*Circus æruginosus*) in Denmark. Mallard's eggs have also been found in nests of the Bean Goose (Hodek, Schwalbe, 1876). The most remarkable duck's nest that I ever heard of was found in 1921 by Mr. A. Wolfe, of Edmonton, Alberta, who wrote me about it. In this nest four species of ducks had deposited eggs. Five eggs were Mallard's, four Shoveller's, five Red-head's, and two Canvas-back's. A Mallard was incubating.

Voice. Every one is familiar with the note of the Domestic Duck, which varies considerably with different breeds, but the note of wild birds is finer, higher pitched and less coarse. The male cannot quack, but has a low reed-like *weeb* which, in spite of its being low, can be heard for several hundred yards on a clear still day. The high-pitched quacking note of the female, which varies greatly in different individuals, sometimes low, and sometimes very high, complaining and shrill, can be heard a great distance over the water, certainly for more than a mile if conditions are favorable. These quacking notes are often linked together into a prolonged call, and this is regarded by Heinroth (1911) as the note of attraction used during the winter and breeding season. The single drawn-out *quack* is an expression of fear, and this is heard also very commonly when the female is leading her young. A still lower

quacking note, corresponding to the clucking of the hen is also heard. Other and more complicated language is used when the female is "hounding on" the male, at which time, with a peculiar head-and-bill movement, she scolds away over her shoulder with a *queggeggegegqueggegeg*. This "clucking" note seems to be used in other ways, for instance in expectation of food, and it is sometimes heard when the bird is on the wing. At night one hears from a feeding flock long-drawn calls from the female, very high pitched for the first few syllables, and gradually decreasing in tone until they become inaudible amidst the noise made by the "dibbling" birds. The male note has much less variety, but during excitement the notes are shortened and run together. According to Heinroth the drake's note may also be varied into a note of attraction used when the pair are searching for a nesting site, though I must confess that I have never distinguished anything of the sort. The drake does, however, have an entirely different call, a short high-pitched whistle, audible only for a short distance; it is used during the breeding season and particularly after the mating act. Other low notes are heard during the display.

The peculiar bony enlargement of the trachea in males was described by Latham and Romsey in 1798, and by many writers since that time. It is large, left-sided, and connects directly with the left bronchus, probably affecting the voice by diverting the column of air. This tracheal bulb is already indicated in embryos ten days old, and in both sexes. But in females it begins to retrogress after the twenty-seventh day, till finally it disappears (Gadow, 1890). The downy young "peep," as in all true ducks, and later on utter a note which is something between a quack and the drake's note. The females are able to quack, though in a coarse rudimentary way, soon after the first plumage is assumed. But usually one can tell sex sooner by the color of the bill and plumage than by the sound of the voice.

Food. Almost all sorts of aquatic plants, every kind of grain, beech-nuts, acorns and other upland foods have been found in the crops of Mallards. The birds are so omnivorous that though chiefly vegetable feeders, all kinds of aquatic animals are also eaten. Some of the more unusual "finds" will be mentioned below. For the normal diet by far the best study is that by McAtee (1918), but even this is chiefly concerned with the winter food, and his specimens were drawn largely from the southern States of the Union, Louisiana being much more heavily represented than any other State. This analysis is based on 1725 gizzards, many of them accompanied by well-filled gullets. It shows that the Mallard is a vegetable feeder, for 90.5% of the entire contents consisted of plant food, but the summer food of course contains a much higher proportion of animal matter. Different families of plants were represented as follows: sedges, 21.62%; grasses, 13.39%; smartweeds, 9.83%; pondweeds, 8.23%; duckweeds, 6.01%; coontails, 5.97%; wild celery and its allies, 4.26%; water elm and hackberries, 4.11%; wapato (duck potato) and its allies, 3.54%;

acorns, 2.34%; while numerous minor items make up the remainder. The animal food is extremely varied and falls into five main groups, of which mollusks constitute 5.73%, insects, 2.67%, fishes, 0.47%, crustaceans, 0.35% and miscellaneous, 0.25% of the whole diet. Among the unusual animal foods were remains of frogs (found in 19 stomachs), nematode worms, fresh-water bryozoans, marine worms, earthworms, water mites and spiders.

I must confess here that the food consumed during the early summer months has been much less carefully investigated for all ducks. We do know, however, that animal food is a far larger item at that time, and that in young birds for the first six weeks it is almost exclusively of this nature.

By far the most exhaustive account of the food of the Mallard in western Europe is to be found in Naumann (1896-1905). According to him the favorite vegetable food is the seed of floating manna-grass (*Glyceria fluitans*), while among grains they show a partiality for barley and oats. The young are particularly fond of duckweed, and the various animals found on it. I have already mentioned the fact that in severe weather the Mallard in Europe becomes marine in its habits. At such times the food may be very similar to the winter food of our Black Duck. Even in July and August Mallards have been forced by persecution to resort to salt flats. W. Thompson (1851) cites a stomach of one in Ireland which contained an eel four inches in length, a crab an inch broad, 948 univalve and bivalve shell-fish of nine species, and 4500 seeds of eel-grass (*Zostera marina*). Thirty-three sticklebacks have been found in a single crop (London Field, April, 1892). In this connection McAtee cites one stomach from Louisiana that contained 28,160 seeds of a bulrush, 8700 of another sedge, 35,840 of primrose willow, and about 2560 duckweeds, a total of more than 75,200 items. Another stomach contained 102,400 seeds of primrose willow, which, if sowed each one foot apart, would have sufficed to cover two and a half acres of ground. In Greenland the winter food of Mallards consists of small shell-fish such as *Margarita helicina*, *Modiolaria* and *Tellina* besides crustaceans (Winge, 1899). Flapper Mallards in England have been found with their stomachs distended with caddis-worm cases, some with larvæ, others without (Corbin, 1888).

With such an omnivorous bird almost every substance is occasionally eaten. In Saxony several have been killed with small particles of gold in the stomach, one of which weighed 47 mg. (Rey, 1898). They have even been accused of killing trout in streams, and in England one was seen to swallow a trout six to seven inches long (Armistead, 1888; Mitford, 1888). Their habits are not always cleanly. Audubon speaks of their swallowing offal and garbage, even putrid fish, snakes and small quadrupeds. On the lower Columbia River (Washington) they have been found feeding on decaying salmon in February, which rendered the flesh of the birds unfit for food (W. L. Dawson and Bowles, 1909). Sanford (in Sanford, Bishop and Van Dyke, 1903) and several Government collectors speak of their feeding on the maggots in

dead salmon. Near Juneau, Alaska, they live during the winter on mussel and barnacle beds and get very rank (A. M. Bailey, MS.). Decaying vegetable matter also is occasionally consumed. In Scotland, C. St. John (1882) found them eating the remnants of diseased potatoes, and preferring them even to corn. In Ayrshire forty or fifty Mallards would visit one potato pit (R. Gray, 1871). One writer speaks of their going to potato fields at night to feed on the small potatoes which lie about upon the surface, and they are said to eat rotten apples in Sussex (Owen, 1895). The following fruits have occasionally been found in their stomachs: blackberries in Cheshire (H. W. Robinson, 1917), blueberries in Norway (Collett, 1869), plums and similar fruits (Naumann, 1896–1905). Their habit of feeding in oak woods has already been mentioned, but this practice is probably not so common as formerly. A large flock feeding in a wood is said not to run along the ground as might be supposed, but the hindmost ones constantly fly over those in front, leap-frog fashion, so that the progress is at least ten miles an hour, the whole producing a "roar like distant thunder" (Gasper, 1893). During a hard winter they fed so commonly on acorns in an English park that the following year hundreds of acres were covered with seedling oaks (Feilden, 1891).

Attention has recently been called to the swallowing of mosquito larvæ by Mallards (McAtee, Auk, vol. 28, p. 287, 1911) and Dixon has gone so far as to recommend the keeping of tame Mallards as a means of exterminating mosquitoes on infested ponds. He quotes his own experiments in this direction (Journ. Amer. Med. Assoc., p. 1203, 1914). Tame birds have been very useful in exterminating slugs from vegetable gardens. W. Thompson (1851) enters into this subject in some detail. Very degenerate habits are occasionally developed among semi-domesticated birds. They have been known to kill and eat sparrows, and to plunder the nests of smaller birds (Liebe, Ornith. Monatsschr., 1894, p. 15; Wacquant, *ibid.*, p. 89).

Before leaving the subject of food, the Mallard's habit of eating shot should be mentioned. It was noted in Italy as long ago as 1786, and has apparently caused the death of many birds there (Savi, 1827–31, vol. 3, p. 161). G. B. Grinnell (1901) called attention to this phenomenon as seen in specimens taken in Texas and North Carolina. The subject has often been discussed in sportsmen's journals in this country, and W. L. Dawson and Bowles (1909) mention two Mallards found on the Nisqually Flats, Washington, one of which contained nineteen and the other twenty-seven pellets, while there were marked pathological lesions in the stomachs and large intestines. Recent experiments by the United States Biological Survey (Wetmore, 1919) show that two or three number-six shot ingested will sometimes cause death, and that six pellets are always fatal. Mallards seem to eat shot much oftener than other ducks, but Pintails, Canvas-backs and Whistling Swans have been found suffering from lead poisoning.

It is necessary for ducks to fill the crop at least twice a day, if not oftener. On

dark nights the feeding is necessarily done by the sense of touch, which is very delicate. The nerve-endings in the bill have been studied by Szymonowicz (1897). Mallards feed chiefly by puddling in the mud or shallow water, and also by skimming animal matter off the surface. The young are very adroit in catching insects as they pass. Audubon, at an early date, called attention to the practice of the old birds of enticing worms from their holes by patting on the ground with their feet. Another trick to move aquatic worms is pictured and described by Millais (1902). The birds are shown standing upright and "treading water" rapidly with their feet, so as to cause a disturbance in the mud and thus bring up the animals. I have seen Black Ducks working up food in just the same way and then "tipping" for it.

Courtship and Nesting. The sexual life of Mallards as well as of many other species begins as soon as the breeding plumage is complete in the autumn, but birds of the year are less active than the older birds. Instances of Mallards displaying while yet in eclipse or even immature plumage have been mentioned (Wormald, 1914). During October and November the male sex-organs begin to increase in size, but they do not actually function until December (Seligmann and Shattuck, Proc. Zool. Soc. London, 1914, p. 23). The birds do not begin to separate into pairs until December. This association becomes more common in late January and February, depending more or less on latitude and weather conditions. Pairing is a gradual process and is preceded by many social games (display), but by March almost all individuals are in couples, though the young probably do not mate until long after the old ones. These habits must always be taken into consideration in forming protective laws, for it goes without saying that ducks should be left in peace as soon as they are permanently paired.

It is not at all probable that a pair stays together for more than one season, that is, from January to May, nor is it likely that attachments formed very early in the season are permanent ones; but in the wild state the Mallard is, roughly speaking, monogamous, though these habits are easily upset in confinement. Even in the natural state the males are far from being model husbands, and particularly during the nesting season they will often pursue strange females. None of the true ducks is as strictly paired as are Sheldrakes, Tree Ducks, geese or swans. Nevertheless, during the mating season the males appear to be more attached to the females than *vice versa*. If the duck is shot down the drake is more likely to return than would the duck in a similar situation.

I think the word *courtship* should be used as Sir Ray Lankester has suggested, to include the whole sequence of events in the pairing of the sexes, as seen in all classes of animals. It may include the search for, the seizure of, or the carrying off of the female by the male, and the fascination of the female by various types of "display" which are often extraordinarily complex, and include song, odor, and strange

antics. Then we must also include fighting between males as another activity of courtship. The word *display* will therefore be used in a restricted sense in describing those social plays which result finally in the choice of a mate; and where display is well developed it is probable that the female does actually select her own mate. But display in birds must not be confused with similar but intentional activities in man, for it is exercised in an unconscious manner and without real understanding. The word *courtship* has an anthropomorphic sound, and seems to imply a conscious and previously planned series of events, but it should not be considered in this sense when applied to behavior in animals. It would perhaps be better to invent an entirely new word to cover the long series of events which result from the "mating hunger" of animals in general.

The display of the Mallard, which is very characteristic, was first described by Naumann. Later writers such as Millais (1902), Heinroth (1911), Wormald (1914), Brock (1914), and C. W. Townsend (1916) have analyzed this phenomenon in detail. As has been indicated above, the display is seen at its best in the early spring, but it has no direct connection with the mating act, and may be seen at almost any time of the year when the birds are in a playful mood. According to Brock it is not seen in truly paired birds. As analyzed by Wormald the various positions of the male during display are as follows: (1) the drake floats idly on the water or swims restlessly to and fro in a constrained attitude, with the neck retracted, so that the head is sunk closely between the shoulders; (2) he raises himself abruptly in the water, at the same time lowering his bill to the surface and then passing it rapidly up the breast accompanying this action by a note, part whistle, part groan; (3) the fore part of the body is depressed in the water, while the tail is raised, and the bill simultaneously opened to the utterance of a series of short notes; (4) a simultaneous upward throw of head and tail, usually immediately followed by the performer (5) swimming rapidly to and fro in various directions, with the head and neck outstretched horizontally just above the surface of the water; (6) (added by Brock) the fore part of the body is raised rather slowly out of the water, and the head and neck are extended upward at an abrupt angle. A characteristic head-shake frequently precedes this action. (See Plate 20.)

The order above indicated is by no means always followed. In fact Brock considers 1, 6, 3, 4, 5, the more usual sequence. The display in the female is far less developed, but she often performs as in (5) and in doing so stimulates the male to respond by actions 2, 3, 4 and 5, particularly the last two. Such display is at first of a general nature, and may not have any reference to individuals of the opposite sex; in other words, as Brock says, they are merely the outward expression of certain forms of nervous stimuli. Nevertheless the attraction or stimulus which a female exerts is in direct relation to her exhibition of display primitive as it appears, and is inverse to her passivity of behavior.

Although pairing is usually initiated by the drake, the females end by actually singling out and pursuing certain drakes, so that during pairing the male is at first active and later plays a more passive rôle. The drake thus singled out usually retires from the female in a very ungallant fashion, perhaps in order to separate from the flock, and at first pays no attention to her. Other drakes follow but are frequently driven away by the female, though serious fights never occur. Attachment of the pairs, though at first weak, becomes later on strong and permanent. Brock concludes, and I think rightly, that there is no selection on the part of the drake, but a definite choice, which may even amount to a strong factor in natural selection, is practiced by the female. The influences governing the choice of the female appear to take the form of certain stimuli provided by the display of the male, the external attributes of the male, or the cumulative effect of both. The whole subject of the relationship between display and choice of mates well deserves further study.

The mating act always takes place on the water, and is followed immediately by a postlude in which the male swims hurriedly in a semicircle around the female, as in position number five, with neck stretched low over the water. A moment later both birds go through rapid bathing actions, in order to shake the water from their feathers. The remarkable nuptial flight, common also to other species, is seen when the breeding grounds are reached. The male of one couple flies after the female of another couple, which has probably encroached upon the former's nesting ground. A mad pursuit begins, both the female's mate and the strange male going through various evolutions at a great height. Finally the strange male becomes wearied, or at any rate breaks away and returns to his own mate. The significance of these flights is not known. Wetmore (1920) evidently considers them part of the display, while Heinroth (1911) who has described them from semi-wild birds, offers no explanation at all. In my opinion these flights are not to be regarded as part of the display, but are rather to be connected with the competition between mated pairs on the actual breeding grounds. Nowhere else, so far as I know, are they seen. But it may also be argued that these flights result from unfaithful males, whose mates are incubating and whose sexual instincts are not yet satisfied. Francis Harper who spent the summer of 1920 in the Athabasca Lake region, and who paid particular attention to ducks, tells me that he saw pursuit flights, mostly around the middle of May, and the last one on June 15. The number of males taking part in these flights varied from two to six.

The nesting period is moderately early, and varies from March to July, according to the latitude and elevation. In temperate regions the Mallard begins to lay about the middle of April, though late clutches are found in June. In California the height of the breeding season is reached in late April (Grinnell, Bryant and Storer, 1918). The earliest record for eggs is for March 25. In England the nesting season is very early, from the end of March to the middle of April. In Greenland eggs have

been found from May 26 to July 18, and in Iceland not before the middle of May. There are many records of young broods seen as late as August and September but these are no doubt due to the destruction of an earlier clutch or brood. It is interesting to speculate on how the female secures a mate for these late broods, for the sex organs of males are supposed to stop functioning by late May, and she can hardly be expected to find her first mate after the young are hatched.

The Mallard usually nests on the ground near the water, but in many cases nests have been placed far from the water. In Europe so many nests have been found in elevated locations such as in trees or on rocks that it can scarcely be regarded as a rare occurrence, but I know of only four authentic instances of such nests having been discovered in America. Nelson (1887) found one in the top of a hollow stump six feet above the ground, in Alaska, and in Oregon one was found in a crow's nest in a willow eight feet high (Walker, 1914). Another was on the trunk of an ash tree in the Willamette Valley (Murie, 1913) and a fourth in a willow tree in Saskatchewan, Canada (Report Chief Game Guardian, Prov. Saskatchewan, 1920, p. 15). There appears to be no authentic record of any tree-nesting in India (Baker, 1908). It is possible to mention only a few of the unusual sites that fill the pages of ornithological literature. Millais (1902) reports one taken on the summit of one of the highest mountains of Perth. Elsewhere in Scotland nests have been found high and dry in the hilly regions of that country. Others have been found in deep forests. In the State of Washington they are said to be frequently placed at the base of a giant tree, like the nest of the Sooty Grouse (W. L. Dawson and Bowles, 1909). When nesting in trees the deserted homes of other species are usually utilized. Ordinarily these nests are at no great distance from the ground, but Yarrell (1856) speaks of one in an oak tree twenty-five feet high, and W. Thompson (1851) mentions one in a silver fir eighty or ninety feet above the ground. In Bavaria one nested in the deserted nest of a Peregrine Falcon eighteen meters from the ground. The tree nests of crows, magpies, storks, and the ground nests of coots have been frequently mentioned. Pollard willows are selected more commonly than other trees. More unusual still are such sites as those on old towers, castles and walls (Ussher and Warren, 1900) and even the thatched roofs of deserted cottages (Taczanowski, 1893). Squirrel cotes have been used in Bohemia (Tschusi zu Schmidhoffen, 1890, p. 248). In Hungary, Mallards are said to nest in the burrows formed by the upturning of the turf during irrigation work (Homeyer, *fide* Naumann, 1896–1905). Wüstnei (1900) and others have called attention to nests that have been found in the immediate vicinity of inhabited fox-burrows.

Mention has already been made of the fact that Mallards will breed at high altitudes. In Turkestan they were found nesting at altitudes of from 6000 to 8000 feet (Lansdell, 1885), 9000 feet in Colorado (Rockwell, 1908), 6225 feet in California (Grinnell, Bryant and Storer, 1918), nearly 6000 feet in Switzerland (Fatio, 1904),

6000 feet in the Caucasus (Radde, 1884), and 9000 feet in the western Himalayas (Hume and Marshall, 1879). Of course only isolated pairs are met with at the most extreme elevations.

There is nothing characteristic about the nest of the Mallard. It is loosely constructed of grass, reeds and rushes, with a considerable depression, which, toward the end of the laying period, becomes thickly lined with down. Some nests, close to the water, are said to have little or no down. The male assists his mate in the nest-hunt, but when incubation commences he becomes more and more independent, until toward the middle of the period he deserts the female entirely. It seems that very rarely, the male will stay with the female until after the young are hatched. Such is said to be the case occasionally in Iceland (Hantzsch, 1905), and Wetmore (1921) has noted it in rare cases at Bear River, Utah.

The eggs are from five to fourteen in a clutch, averaging about ten. Clutches of from fourteen to eighteen have been commonly reported, probably the work of two birds. Young birds are said to lay smaller clutches than the older ones. The color of the eggs is very variable. Although the typical egg is pale greenish blue, many are yellowish cream or almost white. They measure from 52.3 to 64.7 mm. by 38.0 to 45.7 mm. The usual period of incubation is twenty-six days, but so many authorities have given longer periods that one must conclude that the variation is greater than is generally thought. Much of the supposed variation is due, no doubt, to freshness or staleness of eggs; perfectly fresh ones always hatch sooner. Eggs placed under a hen will hatch, according to some writers, about two days sooner than when incubated by the parent; but I have no data to confirm or disprove this.

The female sits very closely, especially when the eggs are far advanced. During the last few days she will not move unless almost stepped on, and she may often be removed by hand. Not only is the nest usually well concealed from above, but the sitting bird draws leaves and grasses around and over her, so there is little except her eyes to attract attention. She leaves the nest once or twice a day (never at night) and when the eggs are well incubated probably not more than once a day. When leaving voluntarily, she covers the eggs with down, but no harm seems to result, even when the nest is left uncovered for a considerable period, since the down serves rather for concealment than warmth. During the last few days of incubation she probably does not leave the nest at all.

There is some diversity of opinion as to the relation between the sexes during incubation. At times the females on coming from the nest seem to be persecuted not only by their own mates, but by other males. Some writers have even said that the female is compelled to conceal her nest from her mate lest he disturb her by his attentions. As usually observed, however, the male remains at no great distance from the nest, and joins the female during her brief feeding period (Wetmore, 1920; *et al.*). When Mallards are artificially crowded on small breeding ponds the males

become exceedingly troublesome. An extreme case of this kind was studied by Huxley (1912). His observations were made at Tring Reservoir, in England, where twelve hundred pairs were breeding. Each year about seventy females were killed by drowning, — in other words about 6% of the total number were destroyed by the males. Conditions similar, but not so serious, have been commonly cited. The fact is that the sexual instinct in the male continues up to and beyond the period when the duck is sitting, and if pairs are closely crowded a certain amount of trouble is bound to result. The sex organs of the male begin to atrophy at the end of May.

After the young are hatched they stay in the nest about a day, and then are taken directly to the water. In cases where the nest is at some elevation the female nearly always coaxes the young to jump down. The bird when in down weighs only 6.5 grams (Collett, 1893 94) and can fall even on hard pavement without sustaining injury. In certain instances reliable observers (Hartert, 1887) and numerous less responsible observers, have seen the mother transporting the young in her bill or even in her feet. At best such cases are very unusual. The question has been entered into with some detail by Naumann (1896 1905). It seems also that the female is able to carry eggs by tucking them up between her chin and breast. Four eggs were seen to be removed in as many seconds and to a distance of eighteen inches in this manner. This incident has been recorded by a photograph (E. L. Turner, 1910).

The care of the young and the marvellous ruses of the female in distracting attention from her brood are common to all ducks, and are familiar to any one who has visited their breeding grounds. It is not so well known that the mother will put to death with a stroke of her bill a duckling that is sick or injured (W. Thompson, 1851; Millais, 1902). Naumann (1896–1905) speaks of a semi-wild male who shook to death and ate six of his offspring, but in the wild state such cannibalistic tendencies are probably never developed. For the first few weeks the young are very delicate and must be protected from cold, storms, and hail. Millais (1902) has well depicted the means adopted by the mother to protect the brood against a sudden cold shower: she stands with back to the wind and with wings outstretched over the young. The broods for the most part remain separate, and females are rather jealous of each other. This is quite different from the behavior of Eiders, Sheldrakes, and especially Mergansers, where one female may have a whole raft of young following her about.

The young are capable of flight at the age of about eight weeks. At this time the female goes through her moult, but does not as a rule become flightless. The young stay together in family groups and probably migrate separately from the old birds, but this is not certain. It does not seem to be known how long the female stays with her brood, or, if she leaves them, whether she rejoins them after completing her moult, and eventually migrates with them. I think it is probable that she merely retires for a short time during moult and later finds her brood again. In some cases

she does not leave the young at all. The drakes have long before separated from their mates, gathered into small groups and retired to dense reed-beds to moult, becoming exceedingly shy, and keeping themselves completely concealed. The quills are shed with extreme rapidity, sometimes all dropping out in one day (Millais, 1902), so that the males are incapable of flight for a considerable period, depending upon the number of quills shed at one time. The eclipse plumage is complete by late June or July, and lasts the rest of the summer, but there is no time during this period when some change in the plumage is not taking place.

Status. The Mallard has greatly increased in numbers in the British Isles since the passage of the Wild Birds Protection Act in 1880. Before that time the birds were shot indiscriminately, even the young being killed before they were on the wing. The increase is said to be most noticeable in the low-lying districts of the eastern counties, south of the Humber (Cordeaux, 1896; Kelso, 1913). An idea of the enormous numbers of Mallards and other ducks killed during the eighteenth century may be obtained by consulting Payne-Gallwey (1886). Pennant (1776) speaks of over 31,000 ducks taken in one season in ten decoys near Wainfleet, Lincolnshire. Early in the nineteenth century most of the fens had been drained and the numerous decoys were rapidly discontinued. Yarrell (1856) and other writers bewail the great reduction, particularly in breeding birds, before their time. On the Continent there appears to have been a decrease by the beginning of the nineteenth century. Naumann in 1842 attributed this to the drainage of swamps and the growth of large cities. It is now thought that the mowing of reeds has an injurious effect, by depriving the birds of suitable nesting places and of shelter during moult. According to Fritsch (1872) there were only 6346 Mallards killed in all Bohemia in 1857. Naumann (1896–1905) points out that the species must have been much more common there at an earlier period, for Palliardi tells us that in 1507 no less than 3020 were shot on one pond. Even in 1900 as many as 3521 were shot on the estates of Prince Schwarzenberg alone. Von Buda writing in 1906 says that fifty years before, the species was very common in southeastern Hungary, while in his time it had become scarce. All over Europe the local breeding birds have greatly decreased in number, but the migrants seem to be holding their own much more successfully. Griscom (1921) estimated about 100,000 at the Camargue delta of the Rhone in December, 1918. An interesting series of figures as to the ducks taken in the decoys of the Friesian Isles is given by Naumann (1896–1905) and they point to the same conditions.

No marked decrease has, so far as I know, been reported from India or China, but the species must be diminishing in both of these localities, for the natives are more and more commonly supplied with shot-guns. Mallards have been shipped from the lower Yangtse to the markets of Europe (Ghidini, 1911).

Dr. M. P. Porsild of the Danish Arctic Station at Disko, Greenland, writes me that Mallards are rather scarce in that region and during sixteen years he has only known of one nest. Very few are sold there as game for the table.

In North America, Mallards were steadily decreasing in number until the passage of the Federal Migratory Bird Law in 1913. Since that time a marked increase in Mallards, Pintails and Teals has been noticed, particularly in the Mississippi Valley and the West. Mallards are now breeding much more commonly than formerly over the northern and central States where the local stock was sadly reduced. Perhaps the greatest danger of the future is in the increasing demand for agricultural land, which is resulting in the drainage of many splendid breeding grounds. It is very unfortunate that many of the areas now being drained are not fitted for agriculture but are the outcome of speculation and promotion schemes. It is necessary, therefore, that large tracts should be permanently set aside, both by the individual States and by the Federal Government, to serve for all time as breeding reservoirs for our wild-fowl. We must not forget that abundance depends upon the area of proper feeding and resting grounds far more than upon the number of guns. Ducks do not necessarily decrease with an increase of shooters for they are creatures of extraordinary adaptability. But just as soon as a country begins to lose its natural wild-fowl reservoirs, the birds grow less in spite of all sorts of restrictive measures.

In New England it is doubtful if much change has taken place in the status of the Mallard for, excepting sporadically, it has always been rare. The last considerable flight was in 1904, when about one hundred appeared in the markets of Boston during one week in October (Forbush, 1912). That same year numbers were seen in Merrymeeting Bay, Maine (F. T. Noble, 1905), and the records of clubs at Currituck Sound, North Carolina, for the year 1904 also show exceptional abundance. It is never regular in its appearance east of the Connecticut Valley. At Long Point, Lake Erie, in the late '80's, from one-third to one-half as many Mallards as Black Ducks were shot. In recent years this proportion has changed materially, ranging from as low as 4% to as high as 15 or 20%. This would seem to indicate that the Mallard is or was decreasing faster than the Black Duck. Such results are not surprising, because the breeding grounds of the Mallard have suffered more than those of the Black Duck. W. L. Dawson (1903) considered the species much diminished in Ohio during the preceding fifty years. I have already pointed out (Phillips, 1912) the probability that Mallards were holding their own less successfully than the Black Ducks at Currituck Sound, North Carolina. An idea of the enormous numbers that were formerly destroyed may easily be obtained by consulting notes in sportsmen's periodicals, and the reports of the State game commissioners. Out of 150,000 ducks shot in Arkansas in the season of 1893–94 no less than four-fifths were Mallards (Howell, 1911). In the winter of 1913–14, 117,843 Mallards were received in the markets of New Orleans, including those taken by amateur hunters. Forbush

(1912) heard that five thousand Mallards and Black Ducks were brought into the market of Georgetown, South Carolina, in a single day. The markets of San Francisco received 47,565 Mallards during the winter of 1895–96 (Grinnell, Bryant and Storer, 1918). In California the Mallard is said by these writers to have been reduced in numbers, but not as much as the Red-head or the Carolina Duck. Irrigation has very much altered the breeding areas in that State, but fortunately, the effect is not proving as disastrous as was at first feared, although it has greatly changed the face of the country. According to the report of the Minnesota State Game Commissioner nearly half a million Mallards were shot in that State in 1919 and 387,000 in 1920 but I feel certain that these figures are too high.

A condition known as the "duck sickness" appeared in our own West some twenty years ago. In the Great Salt Lake region it began to be serious in 1910 and caused the death of hundreds of thousands of ducks in the following five years, so that a great decrease was noticed. This sickness has been definitely proved to be caused by the toxic action of certain salts found in alkali, the result of irrigation systems (Wetmore, 1918).

The recovery by shooting of banded Mallards is a valuable record of the toll which man takes. In England there were 22% of recoveries (Witherby, 1922a) and in the United States the proportion is not very different. Of course not all these were taken the same year they were marked, but by far the largest proportion were.

Enemies. Very few studies of the enemies of the Mallard have been made in America since the time of Audubon. That great authority mentions turtles and fish as being destructive to the young, and White-headed Eagles, Snowy and Virginia Owls, racoons, lynxes and snapping turtles as enemies of the mature birds. He was perhaps in error in ascribing much destruction to the White-headed Eagle, for that bird is chiefly a carrion feeder and turns his attention mostly to cripples, yet I am told that on the North Pacific coast he is very destructive to diving ducks and takes some Mallards, Pintails and Widgeons. The Duck Hawk (*Falco peregrinus*) is destructive to ducks, and the Prairie Falcon (*Falco mexicanus*) has been mentioned as an enemy (Cameron, 1907). Crows, however, are much more serious than all these put together as they are persistent egg robbers and are increasing in many regions. Doubtless mink, weasels, wild-cats and prairie wolves account for some destruction, but the extent of this has never been estimated. The bull snake of the western States is fond of birds' eggs and is known to swallow ducks' eggs.

Many English writers speak of the damage done to the young and half-grown Mallards by large pike. Payne-Gallwey (1882) mentions a pond where the old birds would not lead their young to the water until they were half-grown, because of the danger from these fish. Gulls (*Larus fuscus*) are described as very destructive to young Mallards in northwestern Scotland (Harvie-Brown and MacPherson, 1904).

Millais (1902) has called attention to the fact that the agents most dangerous to the eggs and young are the Carrion and the Hooded Crows, who cause greater havoc than all other vermin put together. This I believe is absolutely true. He says he has also found whole families massacred by stoats (or other vermin). Naumann (1896–1905) who has gone into this question in some detail, gives a long list of predatory mammals, fish and birds that are known enemies of the Mallard in western Europe. This list includes various species of hawks (*Circus æruginosus*, *C. pygargus*, *C. cyaneus*), falcons, crows, ravens, magpies and eagles, foxes, martens, polecats, weasels, otters, rats, pike and possibly even frogs.

The Mallard is also subject to the attacks of various parasites. Cysts of *Psorospermia* have been found, chiefly in the muscles of the breast (Hagen, 1880) and Corbin (1873) tells of a three-fourths grown Mallard found in a dying state with a leech in its mouth. Various feather mites and intestinal worms of nineteen different species are given by Naumann (1896 1905) as parasites afflicting the Mallard.

Damage. In our own West migratory Mallards do not appear in large numbers until the crops are harvested, and local birds are scarcely numerous enough to do much damage. In parts of our Southwest, however, certain grain farmers have received permission from the U.S. Biological Survey to shoot ducks that are damaging their crops. The rice farmers of Arkansas and the Sacramento Valley in California have suffered most. It was estimated that in the autumn of 1917, when the rice harvest was delayed, about $35,000 worth of grain was destroyed near De Witt and Stuttgart, Arkansas (McAtee, 1918). In the Imperial Valley (southern California) after the water is turned on to the fields in midwinter to sprout the seed-grain, vast numbers of Mallards and other ducks appear, presumably from farther west, and are said to do some damage.

In Ireland they have been reported as being very destructive to ripening corn (Ussher and Warren, 1900). Naumann (1896–1905) speaks of similar habits in Germany. They have been reported as also feeding on sprouting grain, but the damage is probably never serious.

Food Value. The flesh of the Mallard is generally as excellent as that of any other species, but it is never on a par with that of the Red-head, Canvas-back or American Widgeon when those superlative fowl are shot under the most favorable conditions. Naturally the quality of the Mallard's flesh varies greatly, depending upon the amount of fat which has been accumulated, partly on the age of the bird, and partly on the proportion and kind of vegetable matter consumed. In the spring and summer the birds are far less palatable than in autumn, when, after they have assumed their full plumage, they begin to gain condition, and lay on a reserve of fatty tissue. When feeding on wild rice or grain left on the stubble fields they become

exceedingly heavy; drakes weighing three and a quarter pounds may be regarded as exceptionally fine although three and a half pounds has been recorded. To many palates the Mallard, after it has been driven to the sea-coast and forced to feed on marine mollusks, acquires a rank and all too gamey taste; but some people prefer the sea-flavor of these birds to the flesh of the inland grain-field ducks. The Mallard does not necessarily become thin on a winter, animal diet off the coast. In Greenland it is said to become "almost as rank as a loon" (Kumlien, 1879), perhaps because of the scarcity of vegetable food. Occasional depraved habits of feeding on dead animal and vegetable matter have already been mentioned, and during such unusual conditions the flesh becomes unfit for food.

It is related of the meat of ducks, that Cato, the elder, used to feed his patients on it. Later, however, the Latin doctors Galen, Ætius, Paulus of Ægina and others, warned against the flesh as being very hard to digest (Keller, 1913).

Domestication. So far as known, the Mallard was not domesticated in ancient Egypt, Assyria, Babylon, or among the Jews. In the time of the Pharaohs it was not yet tamed; and it does not seem to have been an article of game or food until the Twelfth Dynasty (2000 B.C.). There was no true domestication in ancient Greece either, though in Aristophanes' time a few were already kept, probably for religious or medicinal purposes. In Greek mythology the bird was connected with the cult of Aphrodite and consequently with that of Eros and Priapus. The first real attempt at domestication is seen in the elaborate *nessotrophia* (enclosed and covered duck-ponds) among the Romans of the time of Columella and Varro. In these enclosures the birds were fattened for the table, provision being also made for their nesting. Of the widespread utilization of the duck in ancient art, and of the prevalence of duck-figures as favorite bits of feminine ornament I cannot here speak. The subject is discussed in considerable detail by Keller (1913).

While there are traces of the domestication of the goose even in pre-Homeric times, there is absolutely no evidence that the duck was domesticated among the Romans before the beginning of the Christian era. Even then the exact date is shrouded in uncertainty. I am not sure that any one distinguished the wild and the tame Mallards before St. Hildegard referred to them as *aneta silvestris* and *aneta domestica* respectively (twelfth century A.D.). The actual process of domestication is a rapid one, and can easily be observed by any one who cares to make the effort. After two or three generations the natural wildness of the ducklings and old birds disappears. The shape and carriage of the birds become greatly changed; they are more erect and waddling in their gait, heavier and coarser in appearance, and lose almost all inclination to fly. The inbreeding which usually accompanies domestication is very apt to affect the plumage, and fix variations that crop up, especially white primary feathers and other patches of albinism. All these changes are

accompanied by a derangement of the sexual life which results in polygamy and greatly increased capacity for laying eggs. Wild specimens when brought into confinement will usually not lay the first year, but in the second year they nest freely and there is no difficulty whatever in rearing large numbers of young. These young, if raised under hens and hand-reared, become very tame, but if hatched by mothers and left to themselves they remain almost as wild as the parents, taking long flights to and from other waters as soon as their wings are grown.

The various breeds of domestic ducks, all of which, excepting the Muscovy, have been derived from the Mallard, may be briefly enumerated. Least removed from the original parent are the Call Ducks, which have been bred very small and are spoken of as Toy Mallards. Some of these dwarfs are only a little larger than a Teal; they have very short stubby bills, short rounded heads and high shrill voices. I have found such extreme specimens very hard to breed, as the females often prove sterile or become egg-bound. Call Ducks are both pure "white" and "gray," the latter retaining the exact plumage of the wild Mallard, though not quite so brilliant or glossy. Some people suppose that Call Ducks originated in Normandy; really small specimens are now scarce everywhere.

The Black East India is not much kept nowadays. It is a small black breed with brilliant green and purple luster. In reality it is a melanistic variety of the Mallard. Its flesh is pigmented, and it lays an egg with a dark-colored shell. The plumage of the drake is much more iridescent than that of the duck, but old specimens of either sex usually show white feathers, and perfect specimens are rare.

The Cayuga is nothing more than a large East India Duck; the flesh is dark and the males weigh as high as six or seven pounds. It lays a nearly black egg. This breed seems to have originated in New York State, and is not common at the present time.

The Rouen is a giant Mallard retaining the colors of the wild bird and weighing as much as nine to twelve pounds. It is a good table bird but slower to mature than some other large breeds. It probably originated somewhere in France.

The Pekin Duck came from China, and was apparently not known in Europe or America before 1873. It is one of the most useful varieties. These ducks are pure white, and weigh from eight to nine pounds.

The Aylesbury Duck, named after a town in the County of Bucks, England, is also a white breed, but has a deeper keel than the Pekin. It is one of the more valuable of the domestic breeds, being remarkable for rapid growth and early maturity.

The Penguin Duck is a native of Java. It is a remarkable breed, having a slender body, small wings and upright carriage. The bones of the leg are said to be longer and there is often a top-knot on the head. The plumage is gray to white.

The Indian Runner is nearly allied to the last variety, brought from India and introduced into the County of Cumberland, England, in 1850. They are very long

slender birds, with an unusually erect carriage, almost like an auk or a penguin, and with an extraordinary color pattern, very unlike the Mallard's. They do, however, retain the curly tail-feathers, and breed freely with common Mallards. This breed was taken up by fanciers in 1890. They are said to lay more eggs than any other domestic duck, but this is not universally true, for I have kept many which proved poor layers. They are exhibited in two types: fawn and gray, the former being the original color. Apparently this variety is identical with the Penguin Duck described by Darwin as coming from the Malay Archipelago.

The Hook-billed Duck is an old breed mentioned by Willughby and Ray (1676) and apparently not now in existence. It was usually white, but sometimes like the wild Mallard in plumage. It was remarkable for the downward curvature of the bill. I have seen it portrayed in Dutch paintings of the middle seventeenth century.

The Buff Orpington is a recent introduction, the result of crossing Indian Runners and Rouens. The Blue Orpington is an offshoot of the Buff Orpington.

Blue Swedish Ducks are now quite commonly seen in the United States, and this is evidently a recent breed.

A Belgian variety called Huttegem is mentioned in poultry books, and there is a new English breed called the Campbell Duck.

Various breeds of crested ducks are also occasionally kept, are mentioned by Darwin and other writers, and are sometimes seen in poultry shows. They must have been common in Europe, judging from their frequent appearance in Dutch pictures.

Attempts have been made to introduce wild Mallards into the Falkland Islands, but Mr. W. S. Brooks, who was there in 1916, tells me that this has apparently failed. According to Buller it has been introduced successfully into New Zealand, has crossed with the Australian Duck, *Anas superciliosa*, and may in time supplant it. A duck described as *Anas salvadorii* by Büttikofer (1896) from the Island of Sumba is nothing but a semi-domestic Mallard. I have seen the type specimen in the Leyden Museum.

Hybrids. Wild hybrids with the Black Duck are so common in America as to be hardly worthy of note, but it is quite certain that many of these are the product of wild male Black Ducks and half-wild female decoy Mallards. The next most common wild hybrid is the cross between the Mallard and the Pintail, which, however, is very much rarer than the last. Even less common are hybrids from matings of the Mallard with European and American Teal, Gadwall, European and American Widgeon, Shoveller and European Sheldrake. In zoölogical gardens the Mallard has been crossed with almost all the surface-feeding ducks and in most of these the hybrids are fertile. Crosses outside the true surface feeders, and by this I mean the Mallard-like ducks of the genus *Anas* including Pintail, Widgeon and Teal, result, so far as I know, in sterile products. Hybrids produced under artificial conditions are

enumerated below; but this list is probably far from complete and is gleaned from Poll (1911), Leverkühn (1890), Salvadori (1895) and Wormald (1914): *Anas boschas* with *Cairina moschata, Alopochen ægyptiacus, Casarca ferruginea, Anas undulata, Anas superciliosa, Anas melleri, Anas pœcilorhyncha, Anas bahamensis, Anas sibilatrix, Anas flavirostris, Anas chlorotis, Anas querquedula, Lampronessa sponsa, Aex galericulata* (?), *Nyroca rufina, Nyroca ferina, Nyroca collaris, Mergus merganser, Metopiana peposaca.*

Still more remarkable was a cross with an Eider Duck described by W. Eagle Clarke (1912). This extraordinary bird was said not to dive, but to have the habits of a surface feeder. M. Jean Delacour of Clères, France, has some curious hybrids between a male *Asarcornis scutulata* and a female Mallard.

GEOGRAPHICAL RACES

The question of possible races in this species is a difficult one because there is a rather wide range of variation in size. It is also more than likely that with such a common species, collectors will pick out extra fine, or extra large specimens for preservation, particularly in the male sex. A very large series of Mallards from China, Palestine, and the United States in the collection of the Museum of Comparative Zoology shows no constant differences. The largest wing measurement is found in a specimen from the United States, of 296 mm., but Hartert records one of 302 mm. The longest bill (a specimen from Palestine) measures 63 mm. Tarsal length is more constant, and apparently is always under 50 mm. Hartert (1920) finds that American Mallards are slightly larger than European ones. In the series before me, chiefly from eastern China, Palestine, and the United States, the following measurements were obtained, which exactly bear out Hartert's findings.

	Wings			
China	262–289 mm.	Average	272	Males only
Palestine	260–286	"	273	" "
United States	260–296	"	280	" "

It has often been remarked that Mallards from the Scandinavian peninsula are somewhat smaller, but this is not apparent. English and continental sportsmen have called attention many times to a supposedly smaller race of migrants coming from farther north in the winter. Hartert could not prove the existence of either a smaller northern form or a larger southern resident form, so that it is probable that no such races are distinguishable. F. W. Smalley (1919) assigns to these northern birds a weight of only two pounds and a wing of 270–273 mm., while F. S. Beveridge (1919) claims that these "foreign" Mallards seldom weigh over one pound, fourteen ounces. The explanation is probably to be found, as Hartert suggests, in the arrival of northern-bred ducks, which are not so large or well nourished as the local ones. Perhaps also these migrants were hatched later, and are not so fully matured when they first reach England and France.

In regard to the existence of a local form inhabiting Iceland, I must say that I am extremely skeptical. Iceland Mallards were given a name (*Anas boschas subboschas*) by Brehm (Oken's Isis, 1830, col. 997) but Hartert is doubtful about its validity, and from my own observations of three specimens I can see no reason whatever for recognizing such a form.

The Greenland Mallard is in my opinion the only race that is worthy of recognition.

GREENLAND MALLARD

ANAS BOSCHAS CONBOSCHAS BREHM

SYNONYMY

Anas conboschas Brehm, Oken's Isis, 1826, col. 983; 1830, col. 997 (*nomen nudum*); Brehm, Handbuch Naturgesch. Vögel Deutschlands, 1835, p. 865.

Anas boscas spilogaster Schiöler, Vidensk. Meddel. Naturh. Foren. Kjobenhavn, 1905, p. 127.

Anas platyrhyncha conboschas Hartert, Vögel Palæarkt. Fauna, vol. 2, pt. 9, p. 1312, 1920.

ADULT MALE: Bill variable, often just as in *A. boschas boschas* but sometimes shorter, and occasionally narrower. The upper surface of the body in general less brown and more gray in color and the upper wing-coverts more brown and less gray. The wavy markings on the flanks are coarser, more gray and white; while the reddish brown breast area shows a tendency to end in a point, which is often well defined. The tips of the breast feathers are nearly always marked with black spots or cross-bands. The rest of the lower side is somewhat grayer and darker. Wing of eleven specimens, 280–303 mm.

FEMALE: Upper side grayer than in *A. b. boschas*, edges of the feathers and the barring light gray-brown instead of reddish brown. Lower side strongly spotted, even in old birds, and similar to the young of *A. b. boschas*. Only very rarely are the under parts so uniform and washed out as in old European specimens. Furthermore they are whiter and not so rusty (Hartert, 1920).

RANGE: Greenland, on the west coast north to Upernavik and on the east coast north at least to Angmagsalik.

HAWAIIAN DUCK

ANAS WYVILLIANA SCLATER

(Plate 21)

SYNONYMY

Anas boschas? Hartlaub (*nec* Linné), Arch. f. Naturgesch., vol. 1, p. 137, 1852.

Anas superciliosa Dole (*nec* Gmelin), Proc. Boston Soc. Nat. Hist., vol. 12, p. 305, 1869.

Anas superciliosa a. *sandwichensis* Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 649, 1856 (*nomen nudum*).

Anas wyvilliana P. L. Sclater, Proc. Zool. Soc. London, 1878, p. 350.

Anas aberti Ridgway, Proc. U.S. Nat. Mus., vol. 1, p. 250, 1878.

VERNACULAR NAMES

English: Hawaiian Duck, Sandwich Islands Duck.

Hawaiian: Koloa Maoli.

DESCRIPTION

ADULT MALE: "Top of the head blackish, the feathers tipped with pale brown. A dark metallic green stripe from the eyes to the nape. Feathers of the neck blackish, mixed with light brown, those of the upper back and interscapular region blackish brown with crescent-shaped and undulated rufous-brown bands. Lower back, rump, and upper tail-coverts brownish black, with but a few brown feather-edges and spots. Inner tertials and greater scapulars brown, greyish in the middle and narrowly edged with pale brown. Primaries dark greyish brown. The secondaries form a large and fine speculum, bordered behind with a subterminal black line, followed by a white terminal line, and in front by a black line, with a less defined grey band before it. Above the speculum is bordered with a broad velvety-black stripe, formed by the black outer webs of some of the tertials. Rectrices deep brown and blackish, with whitish-brown edges and irregular arrow-shaped markings. The two central rectrices are black, soft, and curled up as in *Anas boschas;* in one old male in abraded plumage the next [lateral feather on one side] shows an inclination to curl up (the other corresponding one being absent), and in two other males there is a distinct beginning to curl up. Sides of head and neck and throat mottled with blackish brown and pale buffy brown. Throat blackish in the oldest male. Breast rufous brown, with U-shaped blackish markings, or more or less rounded spots, these standing before the tips of the feathers and being followed by another blackish mark; the upper breast and sides more rufous. Abdomen brownish buff, distinctly shaded with greyish in the oldest specimens, and varied with greyish-brown spots, in the most matured specimen distinctly, though faintly, cross-barred with ashy brown. Sides of body pale rufous brown, with longitudinal or V-shaped deep brown markings, but in the oldest male some white feathers finely undulated with blackish brown appear on the flanks. Under tail-coverts blackish and brownish, varying much and strongly tinged with rufous in older specimens. Under wing-coverts and axillaries white."

Wing 236–249 mm.; tail 89; culmen 48; tarsus 40.5 (Rothschild, 1900).

ADULT FEMALE: "Blackish brown above with a slight gloss on the head, all the feathers broadly

HAWAIIAN DUCK

OUSTALET'S GRAY DUCK

AMERICAN TEAL

margined with brownish buff and mostly with one or two zigzag bars across. Primaries dark greyish brown. The secondaries form a fine speculum of *deep metallic purplish blue*, which in some specimens and under certain lights passes into green. This speculum is bordered in front with a velvety-black terminal band, preceded by a whitish-grey band, which occasionally is absent or indistinct in a few specimens, and this speculum is bordered behind by a velvety-black band, followed by a white one. Towards the back the speculum is also terminated by a velvety-black line. White tips are in a few specimens indicated or even distinctly developed on the coverts forming a black border in front of the speculum. Rectrices blackish brown, bordered and barred with irregular lines of brownish buff. Under parts buffy brown, darker on the breast, spotted with blackish brown, and more so along the sides of the body and on the breast. Chin mostly quite unspotted and more reddish. Under wing-coverts white, sometimes those near the margin dark brown with pale borders, a variability which, like some others, I cannot account for. Axillaries white, in two specimens, one from Oahu and one from Hawaii, with a few dark brown spots. A very young bird from Kauai, marked female, has the under wing-coverts almost unspotted white, the rectrices with a few pale bars only on the outer ones, besides being bordered all round with pale brown.

"The females vary very much. Some few have a distinctly indicated pale superciliary line; some have the spots on the lower parts much less bold than others, and I take them to be younger individuals, as the already-mentioned very young bird (with the wing-feathers only half grown) has them also less bold. Some variations in the gloss of the speculum, the borders of the latter, and the colour of the under wing-coverts are mentioned above" (Rothschild, 1900).

Wing 216–228.6 mm.; tail 76–83.5; culmen 41–45.5; tarsus 38.

YOUNG IN DOWN: Almost exactly like the young in down of the Mallard, but the olive tint is apparently more variable and generally less intense (Rothschild, 1900). The specimens which I saw at Tring looked to me exactly like young Mallards but of course they were slightly smaller.

DISTRIBUTION

The present species is confined to the Hawaiian group, and is or rather was found on all the islands (Dole, 1879; P. L. Sclater, 1880; S. B. Wilson and Evans, 1890–99; Henshaw, 1902; R. C. L. Perkins, 1903; Bryan, 1915). It used to be common but is now diminishing wherever the mongoose has been introduced (Henshaw, 1902; R. C. L. Perkins, 1903; Bryan, 1915). R. C. L. Perkins (1903) states that it is still common on Kauai, Oahu, Molokai, Maui and Hawaii, but that he did not meet with it on Lanai. It frequents the ponds on the coast, but is most abundant on the mountain streams, being found at altitudes up to 8000 feet. According to Bryan (1915) it had become in 1915, very rare everywhere excepting on Kauai, and in grave danger of extinction. He says that in the open season the Shoveller or the Pintail are more likely to be met with.

Hawaiian Islands

Mexico

One specimen, described by Ridgway as *Anas aberti*, was taken at Mazatlan, Mexico.

DISCUSSION: The Hawaiian Duck is very interesting, because it shows direct Mallard affinities, and is the only other species except the Laysan Teal (*Anas laysanensis*) and the recently described New Mexican Duck that normally carries the Mallard sex-feathers in the tail. Its individual variation is all the more curious, when found in a group as stable as the *Anatidæ*.

Anas wyvilliana was first described by P. L. Sclater (1878) but there was nothing to show to which sex the specimens belonged, except the mark of the collector, who recorded them as males. In the Voyage of the CHALLENGER (Birds, Plate 22) P. L. Sclater (1880a) figures one of these males, which is apparently in juvenile plumage or perhaps in summer moult.

In 1888, Stejneger (1888) called attention to the defects in the original description and in the plate,

and then dealt at some length with the various differences found among the five specimens then at hand in the U.S. National Museum. Other remarks were made about this species by Salvadori (1895) who also considered this bird more or less of an ornithological puzzle. Rothschild (1900, p. 271) in the Avifauna of Laysan, gives two plates of *Anas wyvilliana* and discusses his large series of specimens.

In the ten specimens now before me the main points of sexual difference are as follows. Of the six males, four are correctly sexed, one is not sexed, and one has been sexed both as a male and a female and then had both marks crossed out. There is, however, no question about the sex of either of these two. All six males present the characteristic V-shaped markings on the breast, thickly streaked throat and cheeks, nearly black pileum, sometimes mixed with iridescent green toward the neck, and except in one case evidence of sex-feathers in the tail. In this one case (U.S. National Museum, No. 113,448) the middle tail-feathers are lacking, probably moulted out, as the date is May. The sex-feathers appear to be typically three in number, but there may be four. They are not so well developed as in the Mallard.

Of the four females all are correctly sexed. They all have the streaked under parts, immaculate throats and absence of sex-feathers.

The table of measurements below shows the size difference in the two sexes. This is small and about comparable with that seen in *Anas diazi*.

MALES

	113,447 U.S.N.M.	113,449 U.S.N.M.	131,717 U.S.N.M.	113,448 U.S.N.M.	21,319 U.S.N.M.	15,025 M.C.Z.	Average
Culmen	44	44	45	48	44	46	45
Wing	230	218	223	228	218	212	221
Tarsus	37	39	39	40	39	38	39

FEMALES

	12,788 U.S.N.M. Type of *Anas aberti*	113,450 U.S.N.M.	131,718 U.S.N.M.	48,384 M.C.Z.	48,383 M.C.Z.	Average
Culmen	42	44	41	44	45	43
Wing	212	210	206	215	219	212
Tarsus	35	38	38	38	41	38

We must now turn to Dr. Stejneger's account of the species. He first describes the two males, U.S. National Museum No. 113,447 and No. 113,449, and shows several points of difference between them, especially in the color of the bill, in the anterior white wing-band and in the under wing-coverts and under tail-coverts. No. 113,448 was taken to be a female (absence of sex-feathers noted above) although the specimen is without doubt a male, as evidenced by the characteristic breast-pattern, large size, and dark chin. The smaller upper wing-coverts are broadly margined with cinnamon in this specimen, a character also seen especially well in No. 131,718 and in the type of *Anas aberti*. This certainly looks, as Stejneger himself suggests, like a youthful type of plumage, for the males of more advanced plumage show the small wing-coverts plain drab, slightly edged with white.

Of the other two specimens described as females, No. 21,319 is a typical male, and this leads to a misunderstanding. The only female then which Dr. Stejneger had was No. 113,450. He mentions

among true individual differences, the curious white ring around the eye in one specimen, the transposition of the white anterior wing-bar, the coloring of the lining of the wing, etc. These will be referred to again.

Salvadori (1895) confesses that he does not understand the species. He thinks that domesticated Mallards might have become feral and influenced *Anas wyvilliana*. This seems to me to be not at all probable because of the small size of the species and its uniformity as to measurements. Salvadori calls attention to the characters that distinguish the adult males, and shows that young birds resemble adult females.

Rothschild (1900) in two fine plates shows well the Mallard affinities of the species. His series is a large one and especially interesting are the few white flank feathers finely undulated with blackish brown, which, together with the faint cross-barring on the abdomen occur only in his oldest males. My series shows nothing of the sort, and it is therefore probable, as suggested by Rothschild, that the final male plumage is not attained for several years.

Rothschild calls attention to variability, which he considers greater in the female. In some of his female specimens white tips were present on the coverts which form the anterior edge of the speculum. The different appearance of the under wing-coverts in his specimens is a form of variation which, along with some others, he says he cannot account for.

Aside, then, from certain other curious variations, we have in this species male birds with Mallard affinities readily distinguished from the females, a juvenile plumage like the female's, – very like a partial eclipse plumage, — and almost certainly some changes due to age. To me the most noticeable variation, and one that is certainly not complicated by any question of age, is the color of the speculum-bars. In the males the first band anterior to the speculum is always black, but next to this there is a wide range of color difference. In one case there is a broad white band, in two cases a narrow white band, in two other cases a very indistinct buffy band, and in one case no band other than the black one, which here is very finely tipped with whitish. In the females (*Anas aberti* included) the anterior margin of the speculum is, in four specimens, bordered by a black band formed by black-tipped greater coverts; next comes a band of buff color which shows a marked variation. In one case it is almost indistinguishable, while in three cases it varies from a very light buff to a russet color. In the fifth case, No. 113,450, as Dr. Stejneger has described, the normal white bar is replaced by a gray one, while a new bar of pure white is interposed between the black bar and the speculum, an arrangement entirely unique and non-Mallardlike. The posterior end of the speculum appears to be always uniform: it is bordered by two bars, an inner black and an outer white one. Thus we see a general tendency to variation anterior to the speculum, as has been pointed out for *Anas diazi*. There are several other minor points of interest about *Anas wyvilliana*, one of which is a slight tendency to albinism in at least three specimens.

Note on Abert's Duck (*Anas aberti*): This duck, represented by the single type specimen, taken at Mazatlan on the west coast of Mexico, was described by Ridgway in 1878. At that time *Anas wyvilliana* had just been described by Sclater from a male specimen, and the sex dimorphism of that species was not recognized. Ridgway compared his *Anas aberti* (type No. 12,789 U.S. National Museum) with a specimen of *Anas wyvilliana* thought to be a female. It appears, however, from his description (1878, p. 251) that this bird must have been a male (V-shaped breast markings, densely streaked throat, etc.) so that the similarity of *Anas aberti* and *Anas wyvilliana* escaped his notice.

In 1888, Dr. Stejneger (1888, p. 99) took up the question of *Anas aberti*. He says: "So close is the similarity that I am unable to distinguish No. 113,450 (*A. wyvilliana*), from the type of *A. aberti* except by the larger size and the total absence even of an indication of supraocular and transocular stripes." Now a comparison of the size of *Anas aberti* with four other undoubted female specimens shows that it is in one case even larger than *Anas wyvilliana*. As to the stripes on the head, I can see no difference on comparing the two specimens above referred to by Dr. Stejneger, and at best the

supraocular and transocular stripes in Hawaiian Ducks are very indefinite. They are barely perceptible in the female and absent in the male. A careful comparison of the type of *Anas aberti* with the four other undoubted female specimens in the Museum of Comparative Zoology and the U.S. National Museum, shows no essential difference in color, pattern or size, hence it appears that in the absence of any further material from Mexico *Anas aberti* must be considered as a female Hawaiian Duck, accidentally occurring in Mexico and no longer deserving specific distinction (Phillips, 1912a).

GENERAL HABITS

HAUNTS. This duck is without doubt closely related to the Mallard and is perhaps, as R. C. L. Perkins (1903) suggests, a dwarfed island form of the latter. It may be comparable to Coues's Gadwall of the Fanning Island group. It is a fresh-water duck, but by no means absent from the coast, and according to Henshaw (1902) loves to follow the windings of the little mountain streams as they thread their way through the tangled woods, here and there forming little pools of standing water. Perkins found it equally at home on the hottest coasts, where suitable ponds are found, or in the mountains, up to 7000 or 8000 feet. Not infrequently he met with it in the boggy parts of the forest, and in localities quite heavily timbered, frequenting tiny pools of water in hollows. Even in the precipitous mountains, many scattered pairs visit small pools that form at the foot of waterfalls, temporary or otherwise, leaving these haunts at nightfall to visit the rice and taro patches of the valleys below.

WARINESS. On the mountain streams it is usually tame, rising slowly from the water and affording an easy mark (R. C. L. Perkins, 1903). Henshaw found the Hawaiian Duck tame and unsuspicious in localities where it was not harassed.

FLIGHT. Nothing has been noted that is characteristic of the flight. The birds are usually seen in pairs, or very small companies. Bryan and Seale (1901) speak of meeting with a flock of fourteen, and Rothschild (1900) states that after the breeding season they stay in flocks, for his collector, Palmer, observed aggregations on Niihau numbering at times not less than one hundred.

ASSOCIATION WITH OTHER SPECIES. R. C. L. Perkins (1903) occasionally saw members of this species in company with Domestic Ducks, but it is doubtful if it ever hybridizes with them, for it is too small, and furthermore the size is uniform, while hybrids would be very much larger. In the winter season it undoubtedly associates with the Pintails and Shovellers, and with other northern ducks that visit the islands.

VOICE. The note is similar to that of the Mallard, but less powerful. The females quack loudly as they rise from the water, just as female Mallards do (R. C. L. Perkins, 1903).

FOOD. The stomachs of a pair shot in October, 1899, on the coast of Kauai were

examined by Henshaw (1902) and were found crammed with two species of small fresh- and brackish-water shells (*Melania newcombii* and *Hydrobia porrecta*). I have referred above to their feeding in rice and taro patches. R. C. L. Perkins (1903) says he has frequently found their crops filled with rice, and he states that they are partial also to various kinds of mollusks, to the larvæ of dragonflies and to such other animal or vegetable food as is accessible.

Courtship and Nesting. The nesting-time is very irregular, as might be expected in so uniform and semi-tropical a climate. In some localities at an elevation of 4000 feet, flappers are in fine condition in August, and on New Year's Day, 1893, a pair was shot which had just hatched a large brood of young. The majority, however, breed between March and June (R. C. L. Perkins, 1903). Rothschild's collector took nestlings on Oahu on May 6.

So far as we know the breeding habits are similar to those of the Mallard, but apparently no nests or eggs have ever been described. The birds retire to the small streams of the interior to breed (Henshaw, 1902). R. C. L. Perkins (1903) says that he shot a duck and drake together, and on gathering them up found that they had already hatched a large brood. This would seem to indicate that the sexes remain together and that both take part in rearing the young. Indeed, this is not surprising, when we remember that in nearly all species that lack definite eclipse-plumage changes, the pairs remain together during the breeding season.

Status. This species has greatly diminished in numbers since the intensive cultivation of sugar-cane and coffee began. It is now probably on the verge of extinction. The Norway rat, accidentally introduced, made such ravages on the sugar-cane that the mongoose was imported in the hope of relieving the situation. This animal, the greatly increased number of sportsmen, and the paucity of large areas of open fresh water in the islands, have all contributed to bring about the present unfortunate state of affairs. It seems unlikely that the species can survive many years. Bryan (1915) said that it was very rare, except on Kauai, and in a letter written to me in August, 1920, the same authority has no further information. He does say, however, that this duck is at present protected by Territorial law and even the killing of specimens is prohibited.

Food Value. The Hawaiian Duck is a good table bird and was formerly shot in great numbers by sportsmen, chiefly about the ponds in the plains, but to some extent in the mountains also. In the old days it, together with gallinules and coots, was eaten by the natives who held it in high estimation.

Behavior in Captivity. So far as I know this species has never been imported alive into either America or Europe.

LAYSAN TEAL

ANAS LAYSANENSIS ROTHSCHILD

(Plate 21)

SYNONYMY

Anas laysanensis Rothschild, Bull. British Ornith. Club, no. 4, p. xvii, 1892.

Horizonetta laysanenis Oberholser, Proc. Biol. Soc. Washington, vol. 30, p. 120, 1917.

VERNACULAR NAME

English: Laysan Teal

DESCRIPTION

ADULT MALE: Forehead deep shining brown, almost black, due to the fact that the black tips and margins of the feathers are quite abraded; top of head and neck similar, but showing more brown on the sides; the chin shows some white feathers, and there is a somewhat irregular ring of white feathers around the eye. Feathers of the upper surface deep blackish brown, with more or less irregular U-shaped or rather "obomegoid" (Ridgway, Nomencl. Colors, pl. 15, fig 8, 1886) markings of a light rusty brown; scapulars and greater wing-coverts with several markings, and all the feathers with more or less abraded borders of the same color; rump and upper tail-coverts more shining black; a large speculum of deep green, more velvety black behind and on the upper margin, bordered below by a broad white line. Primaries pale brown, with pale, almost whitish, edges. Feathers of the lower surface very pale rusty brown, with irregular darker bars and spots, somewhat whitish near the shaft and base. Under wing-coverts brown and rusty with a good deal of white, axillaries white with pale brown spots (Rothschild, 1900).

Wing 192–210 mm.; culmen 39–40; tarsus 37–39.

ADULT FEMALE. Differs from the male in having more white on the chin and upper throat, in having much bolder and more patch-like rusty markings on the upper surface, and in the speculum being indicated only (Rothschild, 1900).

"Iris brown; upper mandible blackish, green towards the edges; lower mandible bluish brown, with a dull orange mark at the base; tarsus and toes dull orange, webs brown with a bluish tinge" (Rothschild, 1900).

Wing 190.5–195.6 mm.; tail 88.9; culmen 39–40.6; tarsus 35.5–43.1.

YOUNG IN DOWN: One specimen taken May 20, 1902 (U.S. National Museum), pileum black; two black streaks, one postorbital and one below and behind eye; area between eye and base of bill also black; rest of face and forehead, except a median streak, rich yellow brown; chin and throat yellow buff; mantle dark gray with yellow hairs; back and rump nearly black; under parts rich sulphur-yellow color.

REMARKS: A pair of adults in the United States National Museum shows the male with the entire head freckled with white except on the pileum. A ring around the eye is all white; throat and chin very much marked with white, and the postorbital area very white; the white freckling stops suddenly at

the junction of the neck and the body. The head of the female is also slightly marked with white. The appearance of albinism in this species is extremely interesting, and explainable by the intensity of the inbreeding that must have taken place on this small island.

DISTRIBUTION

THE Laysan Teal is peculiar to Laysan Island, Hawaiian group. The island is only three miles long and contains one small fresh-water pond. According to von Kittlitz (1834) it occurs also on Lesianskv Island, but this statement has never been verified. On Laysan it has never been very common, and is at present reduced to small numbers. W. K. Fisher (1903) estimated its numbers at less than one hundred, and in 1911, Dill and Bryan (1912) saw only occasional flocks of from two to six birds. Mr. Palmer tells me that in 1918, there were only about thirty-five specimens left on the island. The species has been recorded also by Rothschild (1900) and Schauinsland (1899).

GENERAL HABITS

THERE is almost nothing to be added to the account given by W. K. Fisher (1903) of the habits of this bird. I quote his notes in full. "It is surprising that an islet scarcely three miles in its longest dimension should harbor a peculiar species of the genus *Anas*. The birds themselves are scarcely less peculiar than their distribution. Most of us picture ducks as among the wariest of wild-fowl, but the Laysan Teal, though not exactly tame, are at any rate quite unsophisticated. These birds congregate in greatest numbers about a little rush-bordered fresh-water pond, mentioned in the narrative. Here we could find them at any time, standing usually on a little pile of rocks near the center. When disturbed near shore they quietly swam out to their rock and sunned themselves by the hour. We saw the ducks also on other parts of the island. Near the habitations there was a pair which probably had a nest in the vicinity. One of these used to come up to the house after nightfall and walk about like a barnyard fowl. Mr. Schlemmer said it was searching for millers.

"The stomach of a male collected near the pond was gorged with small flies resembling the common housefly. Although these ducks can fly perfectly well they ordinarily did not take wing until approached within a few rods, and then never went far. They much prefer to walk, and we used to see them strolling about in pairs, or even threes. In this way they pick up their food as they go along. We never saw any Teal near the ocean, and it is probable they never swim in salt water.

"We were fortunate enough to discover one nest within a couple of rods of the pond, placed under a thick chenopodium bush. Six eggs of the palest green rested in a shallow bowl, formed of long dry juncus stems. The hollow was a little over five inches in diameter. As I wished, if possible, to secure a picture of the female, I photographed the eggs and left them till the following morning. When I returned to the nest, however, three of the eggs had hatched, one young was half out, another egg picked, and only the sixth remained whole. In shape the egg is a blunt ovate and measures 55 by 38 millimeters. Two days later (May 21) Mr. Snyder saw three

old birds with broods, one of which took to the pond. I also saw a young one swimming about, the mother being hidden somewhere in the tangle of grasses."

Eggs which I saw at Tring were pure white to greenish white, smooth and without gloss.

STATUS. Rothschild's (1900) collector, Palmer, found the Laysan Teal generally in pairs but sometimes in groups of a dozen or more. Like all observers since his day he found them exceedingly tame and says he never saw them on the water, though often near the beach. They frequented the scrub all over the island, but were "not very plentiful." Three years later W. K. Fisher (1903) estimated their number at less than a hundred, and suggested that the Man-o'-War Bird (*Fregata aquila*) was keeping them in check. In 1909 a party of Japanese plumage-hunters landed on Laysan and in the process of collecting albatrosses almost exterminated the Teal, which they presumably used for food. Two years later when Dill and Bryan (1912) visited the island to report on the bird reservation set aside by President Roosevelt in 1909, and which included this island, they could not be sure that there were more than six individuals left. I was recently told by Dr. T. S. Palmer that they were certainly reduced at one time to ten, but that according to the latest report he had, there were in 1918 some thirty-five individuals. Another factor in the destruction of the wild life on the island was the introduction of the domestic rabbit, about 1903, by the former manager of the guano company, who planned to start a rabbit-canning industry. By 1911 rabbits had increased enormously but had not yet exterminated the vegetation. A. M. Bailey (1919) describes a recent attempt to exterminate the rabbits, which he says have overrun the island, and are destroying all vegetation, so that the sand is drifting. Such conditions cannot but endanger the existence of the Teal. During Bailey's visit alone, 5000 rabbits were killed It is to be hoped that some means will be found to put an end to this pest.

In a letter written by Dr. A. Wetmore, from Honolulu, in July, 1923, he tells me of his visit to Laysan in April and May, 1923. He found twenty Teal and collected six, leaving a breeding stock of fourteen. He adds that those remaining showed traces of albinism, and were so lacking in power of flight that they were exhausted after going one hundred and twenty-five yards. He easily ran them down and captured some by hand.

OUSTALET'S GRAY DUCK

ANAS OUSTALETI SALVADORI

(Plate 21)

SYNONYMY

?Anas boschas a. *freycineti* Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 649, 1856 (*nomen nudum*).

Anas oustaleti Salvadori, Bull. British Ornith. Club, no. 20, p. i, 1894.

VERNACULAR NAMES

English: Oustalet's Gray Duck, Marianne Islands Duck, Ladrone Duck.

Marianne natives (Chamorro language): Nagai, Ngang or Ñgaáñga.

DESCRIPTION

ADULT MALE AND FEMALE: A specimen in the U.S. National Museum (adult female, June 6, 1900) shows general similarity to the Hawaiian Duck, but it is much darker above, with the back, mantle and scapulars nearly black and the feathers narrowly edged with light brown. Salvadori compared the bird to *Anas superciliosa*.

Top of the head brownish black, according to Hartert, having a slight greenish gloss. An indistinct blackish superciliary stripe is separated from the top of the head by a narrow pale line. Sides of the head and neck buff, streaked with dark brown; chin and throat immaculate. The speculum is bluish purple, very similar to that of the Hawaiian Duck, and never a pure metallic green as in *Anas superciliosa*. It is bordered above and below by a black line, followed by a white band. Wings dark brown; under wing-coverts and axillars white.

Iris light seal brown. Bill slate-gray or perhaps yellow sparingly spotted with black. Legs and feet yellow or reddish yellow.

Wing 242–265 mm.; culmen 49–55; tarsus 40–42.

YOUNG IN DOWN: Two downy young secured by Seale have the general upper coloring brown, a buffy spot on each side of the rump, the throat, neck and general under coloring buffy, a wide and distinct superciliary line of buff, a black line from the upper mandible through the eye, and a splotch of brown at the nape and another at the sides of the head below the ears. Upper mandible black, lower yellowish; feet brownish.

REMARKS: This species was tentatively placed next to *Anas boschas* by Salvadori (1895) on account of the tendency of the central tail-feathers to curl up. Hartert's series showed the central rectrices soft but not curled up, and the sexes not differing materially. The bird seems to me to have affinities with both the Hawaiian and the Australian Ducks.

DISTRIBUTION

THIS species is known only from the islands of Guam and Saipan in the Marianne group, and has been recorded from there by Salvadori (1894a), Oustalet (1896) and Hartert (1898b). Matschie (1901) states that it is a breeding bird there but almost all the information we have is to be found

in A. Seale's Report of a Mission to Guam (1901, p. 25). According to this observer the species is not uncommon throughout the entire year and nests on the swamps and streams of Guam. It has also been reported for Guam by Safford (Contr. U.S. Nat. Herbarium, vol. 9, p. 80, 1905). More recently it was mentioned by Provazek from the northern islands (?) (Die Deutschen Marianne, Leipzig, 1913).

GENERAL

I HAVE not been able to find out anything about the habits of this duck. Dr. Henry E. Crampton, who visited the Marianne Islands in 1921, wrote me that he did not meet with it in the interior regions of the several islands which he visited. He thinks that, owing to the larger population on Guam, and the lack of suitable areas for the birds, the species is probably more common on islands to the north, especially Saipan, where there are marshes. Dr. Crampton does not think that imported mammal pests have diminished its numbers. Dr. W. E. Safford, of the U.S. National Herbarium, tells me that this duck has no natural enemies, as there are no birds of prey on the islands except a small owl. Dr. W. E. Weston, of Harvard University, spent a month upon Guam in 1918 and did not see any ducks, but he was told about the bird by the natives, and learned its native name.

A letter just received (June, 1923) from Mr. H. G. Hornbostel, collecting at Guam for the Bishop Museum of Honolulu, gives the following information. He tells me that the duck is found only on Guam, Saipan, and Tinian and is now very rare, for there are no laws to prevent "unnecessary" bird slaughter. It lives in the interior, and in Guam is found only along the valley of the Talafofo River. My informant adds that he does not know the number of eggs laid by this duck, but it breeds in tall grass along the river at the end of the rainy season (January and February).

MEXICAN DUCK

ANAS DIAZI RIDGWAY

(Plate 22)

SYNONYMY

Anas obscura Lawrence (*nec* Gmelin), Mem. Boston Soc. Nat. Hist., vol. 2, p. 314, 1874.

Anas diazi Ridgway, Auk, vol. 3, p. 332, 1886.

VERNACULAR NAMES

English: Mexican Duck, Diaz's Duck.

Spanish: Pato triguero.

DESCRIPTION

ADULT MALE: From *Anas rubripes* this species can be told by the broader and more fulvous edging of the feathers of the mantle and scapulars, and by the presence of a broad white wing-bar both in front of and behind the speculum. From *Anas fulvigula*, which it more nearly resembles, it can be told by the white speculum-bars, by the generally darker and more uniform appearance of the back and scapulars, and by the absence of a black area at the base of the culmen. From the male Mallard in eclipse plumage it is easily distinguished by its darker under parts. The wing, especially the speculum, is almost exactly like that of the Mallard.

From the female Mallard this species is easily separated by its much darker and more heavily mottled under parts, which are the same shade all the way from neck to vent.

Iris brown. Bill bright yellow. Tarsus light orange to coral-red color.

Wing 270–285 mm.; tarsus 43–48; culmen 50–53.

ADULT FEMALE: Similar to male but with a more streaked, and less spotted pattern on lower side, this difference being due to a different feather-pattern on breast and abdomen.

Iris brown. Bill orange with dusky markings, nail black. Tarsus dull orange.

Size smaller than male. Wing 240–260 mm., average 246; tarsus 40–46, average 43; bill 48–53, average 51.

FIRST (JUVENAL) PLUMAGE OF BOTH SEXES: Streaked on lower parts like the adult female, and with soft parts duller in tone. Anterior white wing-bar not so clearly defined nor so broad. Tail feathers blunt.

Note: A large series of immature and female specimens shows that young at this stage are extremely difficult to separate from young Mallards of the same age, but the lower parts are as a rule somewhat more thickly streaked with a darker brown color. Size small.

YOUNG IN DOWN: No specimens available.

DISTRIBUTION

Mexico

This rare Mexican species appears to be non-migratory and is apparently confined to the highlands of central Mexico. Its status is extremely uncertain, and has been much confused because of the fact that some writers interpret in different ways the various references to *Anas obscura* in Mexico. Cooke (1906) evidently understands the record of *Anas maculosa* in Chihuahua as applying to the present species, but this might be questioned, for Mr. Charles Sheldon tells me that he shot many "Black Ducks" near Chihuahua City, and that he is not certain what species they belonged to. As far as can be determined the present species is resident in the high area included in the States of Tepic, Jalisco, Michoacan, Mexico, Puebla, Guanajuato, and probably parts of Hidalgo and Zacatecas. Grayson (Lawrence, 1874) found many in pairs at Tepic in June and supposed that it bred there, though he saw none as far north as Mazatlan. Sanchez (1877–78) has also recorded it from Tepic, while it has been found by Dugés (1869) at Guadalajara in Jalisco. Cooke (1906) is authority for the statement that it occurs in Michoacan, but I have been unable to discover the source of his information. In the lake region of the Valle de Mexico the species seems to be more common than elsewhere, having been recorded from there by Sanchez (1877–78), Villada (1891–92) and Herrera (1888). Villada (1891–92) states that it is found in winter in the Valle, and as far as known it is a non-migratory bird there. At Lerma, a very high valley northwest of Mexico City, Goldman (U. S. Biological Survey) found several specimens of this duck. The type examples were taken by Ferrari-Perez (1886) in Puebla at San Ysidoro. He found the species in May. Farther north he took specimens at the Laguna del Rosario, Tlaxcala. Mr. W. W. Brown visited the lake region near Mexico City in the fall of 1910 in the interests of the Museum of Comparative Zoölogy, and sent back a series of six males and seventeen females. There are no records of its occurrence in Hidalgo, but it has been reported from Guanajuato by both Sanchez (1877–78) and Dugés (1869).

GEOGRAPHICAL RACES

NEW MEXICAN DUCK OR HUBER'S DUCK

ANAS DIAZI NOVIMEXICANA HUBER

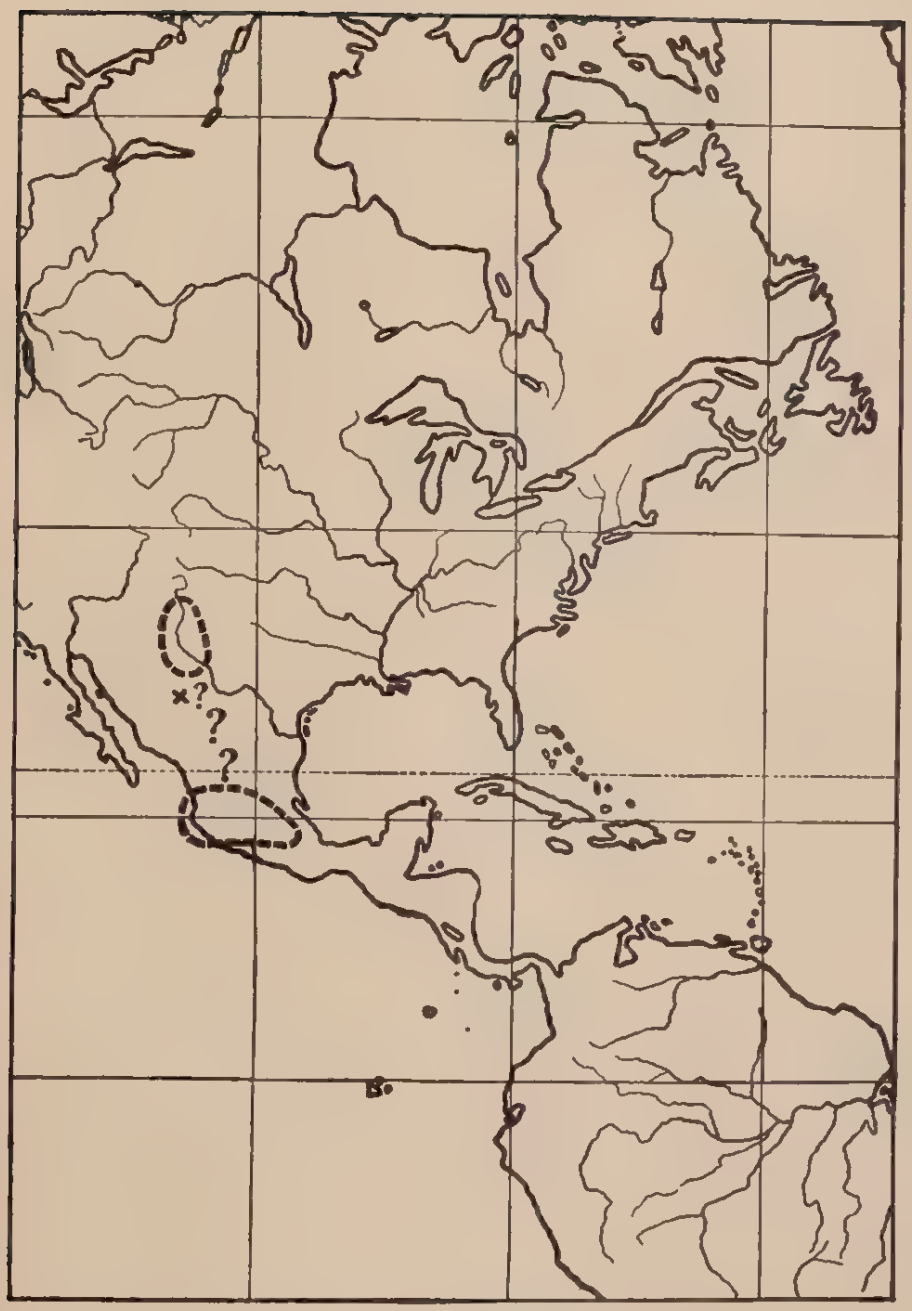
SYNONYMY

Anas novimexicana Huber, Auk, vol. 37, p. 273, 1920.
Anas diazi novimexicana Conover, Auk, vol. 39, p. 412, 1922.

DESCRIPTION

ADULT MALE: Very similar to *Anas diazi diazi*, but apparently always to be distinguished by an irregular wavy barring of fulvous color on the mantle. In some specimens there is a tendency to a darker and more mottled breast. In the series before me are ten undoubtedly adult males, including the type. These are very puzzling birds because they are not exactly uniform and show in several cases marked Mallard characters. These are most pronounced in specimen No. 26,041, J. E. Thayer collection (Las Cruces, New Mexico, April 6, 1920). In this bird the under tail-coverts are nearly jet black, some of the upper tail-coverts are metallic green and the two central tail-feathers are distinctly upturned and very pointed. A few green feathers are present around the back of the head and the long scapulars are covered with fine dots, both Mallard characteristics. In specimen No. 635 (collector's number) three central tail-feathers are almost black and nearly as upturned as in a male Mallard. From a male Mallard in full eclipse plumage this race can be told by its darker under surface and barred, rather than plain-colored mantle.

Iris brown. Bill bright yellow. Legs orange.



MAP 29. Distribution of Mexican Duck (*Anas diazi*)
Sporadic record indicated by cross (×); supposed distribution by interrogation marks (?)

Size same as in Mallard. Wing 268–285 mm., average 270; bill 50–57, average 52; tarsus 40–49, average 46.

ADULT FEMALE: Very similar to male, but lower parts more evenly streaked, and breast without mottled appearance. Upper surface practically the same as in the male. The females of this race are very similar to the female Mallard, and are only to be distinguished by the darker and heavier streaking of the lower parts. The darker types of the female Mallard are difficult to tell from the females of the present race, but they are somewhat lighter in tone and less heavily marked on the lower abdomen and about the vent. Wing similar to that of female Mallard, but anterior white wing-bar often less conspicuous and lesser wing-coverts with a narrow fulvous margin instead of nearly uniform brownish slate-color.

Iris brown. Bill orange, dusky about nostrils. Legs and feet dull orange.

Size smaller than male. Wing 245–260 mm., average 253; tarsus 42–52, average 46; bill 48–51, average 49.

Compared to the female of *Anas diazi diazi* this subspecies has the feathers of mantle and scapulars more broadly margined with fulvous, giving the whole upper surface a less uniform appearance.

MALE AND FEMALE IN FIRST (JUVENAL) PLUMAGE: Ten specimens taken at Las Cruces in August and early September give an excellent representation. They are like the female, but the lower parts are even more definitely striped from neck to vent. Mantle and scapulars somewhat darker than in adult female and feathers not so broadly margined with fulvous. Anterior white wing-bar usually very obscure, but this does not hold in every case. Sexes similar, except for color of bill which is brighter in the male.

From immature Mallards of the same age this series is distinguished by a darker and more smoky cast to the whole lower surface, while the anterior white wing-bar is usually much less pronounced. It is possible that some individual specimens might be difficult to place, but this is not the case with the material at hand.

Wing 217–263 mm., average 240.

REMARKS: The New Mexican Duck is here relegated to the rank of a subspecies because of its undoubted close relationship to the Mexican duck, *Anas diazi*. It was described by Mr. Wharton Huber as a full species. The series before me is comprised as follows:

Adult Males

	Mesilla, New Mexico.	April 12, 1915. Elevation 3840 feet.
	Las Cruces, New Mexico.	September 6, 1920. Elevation 3800 feet.
	Las Cruces, New Mexico.	January 25, 1920. Elevation 3900 feet.
	Las Cruces, New Mexico.	January 25, 1920.
Near	Las Cruces, New Mexico.	May 12, 1920.
Near	Las Cruces, New Mexico.	April 6, 1920.
Type,	Las Cruces, New Mexico.	April 7, 1920.
	Las Cruces, New Mexico.	April 2, 1920.
	Rio Grande River, west of Las Cruces.	May 7, 1915.
	Belen, New Mexico.	December 9, 1917. Collected by Aldo Leopold.

There are seven adult females from the same region and one female which is difficult to classify, and may be an extremely dark type of Mallard. There are ten juveniles, both sexes, taken at Las Cruces in August and September, 1920. Besides these are a number of adult and juvenile Mallards taken in the same region, which clearly show that the present race is not a hybrid with the Mallard, for the Mallards of this region show no peculiarities among either males, females or young. Pairs of the New Mexican Duck were shot together in full breeding condition.

It is more than likely that other specimens of this duck will be found in collections. Black Ducks, probably of the *diazi* type, are found, according to Mr. Charles Sheldon, in central Chihuahua, Mexico, and a correspondent, Mr. Charles K. Jameson of El Paso, Texas, writes that he has shot "Black Ducks" in northwestern Chihuahua, 200 miles due south of Columbus, New Mexico. He adds that he once saw two in the pine woods of the Sierra Madre Mountains at an altitude of 8000 feet. He thinks, however, that they must be rare all through this region. Dr. A. Wetmore noted a large, dark-colored duck at Lake Burford, New Mexico, and there is a female in the collection of the U.S. Biological Survey taken at Grafton, California, July, 1900, which appears to belong to this race. Another female taken at River Arrib, New Mexico, July 17, 1913, is also in the collection of the U.S. Biological Survey.

Mr. Aldo Leopold stated that near Albuquerque, New Mexico, on the Rio Grande River, where he has done much shooting, these ducks represent about 5% of all ducks shot. They pass southward, according to his observation, early in the season.

Black Ducks of some sort have been taken in the Uinta Mountains (southwestern Wyoming or northeastern Utah), according to G. B. Grinnell (1873). Other "Black Ducks," perhaps this New Mexican Duck, were said to be common at Rush Lake, Utah, in November (Yarrow, 1877), while Brackett (1877) found so-called "Black Ducks" in southern Wyoming in April. This, or possibly *Anas rubripes* has been taken several times in Colorado (W. L. Sclater, 1912). A female specimen, said to belong to this species, was reported by Conover (1922) for Dad's Lake, Cherry County, Nebraska. It was taken on October 17, 1921.

HABITS

The following field notes were contributed by Mr. Huber and kindly sent to me by Mr. A. C. Bent. I quote them almost entire.

"In the valley of the Rio Grande River from El Paso, Texas, north to Albuquerque, New Mexico, this northern form of the *diazi* group makes its home. Whether on the mud-flats in the river, the numerous alkali ponds or cat-tail swamps throughout the valley, this duck is ever watchful and wary of man.

"I have observed several New Mexican Ducks about three miles north of the city of El Paso, Texas, hence they probably range down the river possibly as far as the Big Bend country in Texas. In June, 1915, I saw five individuals at Belen and two at Albuquerque, New Mexico, on the mud-flats in the Rio Grande River.

"Courtship. During the months of April and early May, 1920, I watched the courtship of several pairs of these ducks along the Rio Grande River west of Las Cruces, New Mexico. In April two, three and sometimes five New Mexican Ducks could be seen on the mud-flats in the middle of the river, as often with flocks of Mallards as alone. When with a flock of Mallards they would stay together and not mix with the former. The male could be seen bowing to the female and occasionally pecking and pulling at her wing-feathers. When in the water the male would swim close to the female he had chosen, generally behind her, swim close up and pull at her feathers quacking all the while. If another (presumably a female) came too close he would swim rapidly at the intruder until she was driven to a safe distance. Returning to his prospective mate he would bob his head up and down a number of times quacking contentedly. Early in May these ducks were evidently mated as they were always seen in pairs or single birds.

"On May 7, 1920, while watching a pair of the ducks on a mud-flat in the middle of the Rio Grande River west of Las Cruces, New Mexico, I witnessed a very interesting performance. Both ducks took flight simultaneously, rising in the air at an angle of about thirty degrees. They were flying slowly, their wings seeming to rise higher than in ordinary flight, both quacking incessantly. They passed the point where I was concealed about four hundred feet away and about three hundred

FLORIDA DUSKY DUCK

Male Female

MEXICAN DUCK

Female Male

feet high, the male (as I afterward learned) directly above the female. Making a large circuit over the land, the male all the while keeping his position directly above the female, they swung again over the river coming head up into the light wind, whereupon they set their wings and descended to the water, the female slightly in the lead. Immediately upon alighting copulation occurred.

"NESTING. The nest and eggs of the New Mexican Duck, so far as I know, still remain to be described. Although I hunted almost daily during the last half of May and the first half of June, I was not successful in locating a single nest of this species.

"YOUNG. On July 20, 1920, in a cat-tail (*Typha latifolia*) swamp of about seven acres extent, four miles southwest of Las Cruces, New Mexico, I flushed a female that evidently had young. She flew over the cat-tails in circles, while I spent over an hour wading the swamp looking for the young; she was apparently not at all afraid of me, as she passed time and time again within a few feet of my head. I did not, however, find the young. On July 27, 1920, a young fully feathered male and an adult female were collected from a flock of twelve individuals that were feeding where the overflow from an irrigation ditch ran into the Rio Grande five miles southwest of Las Cruces, New Mexico. From this date on, flocks of from ten to twenty-five young accompanied by old females could be seen feeding along the river-bank. Even at this age they were extremely wary and one could get within range only by the greatest stealth and stalking.

"FOOD. The feeding habits of this species are similar to those of the Mallard. They feed along the river-banks, in the drainage-canals, ponds and cat-tail swamps. In the spring the flooded alfalfa-fields are favorite grounds for food. Ever extremely wary, they pass much of the daytime on the mud-flats in the middle of the river. At dusk they seek their favorite feeding grounds, cat-tail swamp or flooded alfalfa-field, even though it lie close to a ranch house or small settlement. The food I found to consist of green shoots of alfalfa and cat-tail, grass roots, corn, wheat, and numerous small fresh-water shells together with the larger seeds of weeds and grasses.

"BEHAVIOR. The flight of the New Mexican Duck is similar to that of the Mallard but stronger and somewhat faster. It was during the very heavy wind-storms lasting two or three days that occur in March in southwestern New Mexico that I noticed the greater strength of flight of this species over the Mallard. One could easily distinguish an individual of this species in a flock of Mallards by its darker color and conspicuous pyrite-yellow bill.

"While feeding in the ponds and flooded alfalfa-fields it keeps a short distance away from the other ducks. Food is obtained in the deeper water by thrusting the head straight down and keeping the body nearly submerged by the use of the feet, the tail only standing straight up above the water. I have never seen this duck dive even when wounded. Several times while hunting with decoys on some of the larger ponds, combined flocks of Mallards and New Mexican Ducks would alight a hundred or more yards beyond the decoys. Ever wary and suspicious the New Mexican Ducks would feed by themselves and never venture nearer the decoys, while the unsuspecting Mallards would soon be swimming in and out amongst the wooden ducks."

FLORIDA DUSKY DUCK

ANAS FULVIGULA RIDGWAY

(Plate 22)

SYNONYMY

Anas obscura Audubon, Ornith. Biograph., vol. 4, p. 15, 1838 (in part).

Anas obscura, var. *fulvigula* Ridgway, Amer. Naturalist, vol. 8, p. 111, 1874.

Anas fulvigula Ridgway, Proc. U.S. National Museum, vol. 1, p. 251, 1878.

Anas maculosa Sennett, Auk, vol. 6, p. 263, 1889.

Anas fulvigula maculosa Coues, Auk, vol. 7, p. 61, 1890.

VERNACULAR NAMES

English: Southern Black Duck, Florida Dusky Duck, Florida Black Duck, Brown Mallard, Striped Mallard, Summer Mallard, Summer Duck, Summer French Duck, Dusky Duck, Mottled Duck, Texas Dusky Duck, Mexican Mallard.

French: Canard des Isles, Canard noir d'été.

German: Florida Dunkele Ente.

DESCRIPTION

ADULT MALE: Similar to *Anas rubripes* but paler all over. Edges of scapular feathers black, those of rump more broadly margined with buff; feathers of mantle with central buffy areas. Lower surface not very different from that of *Anas rubripes*, but whole head very much paler, the lower cheeks, chin, and throat immaculate. Speculum usually the same, but in a few specimens it is much more green than purple, and different from any speculum of *Anas rubripes*.

Iris dark brown. Bill very brilliant yellow or cadmium orange with nail black, and a black line along base of culmen. Membrane between rami of lower maxillæ black, and a black area one quarter-inch wide at angle of jaw. Legs and feet brilliant orange.

Size slightly smaller than *Anas rubripes*. Wing 241–263 mm., average 252; bill 53–59, average 54; tarsus 45–48, average 46.

ADULT FEMALE: Very similar to male but upper breast not quite such a rich brown color and lower parts in general somewhat more streaked and less mottled in appearance.

Iris as in male. Bill dull orange, with dirty black spots, especially below nostril, and a black area at angle of culmen. Legs and feet reddish orange, not so brilliant orange as in male.

Size considerably less than male. Wing 223 242 mm., average 236; bill 49–54, average 52; tarsus 41–46, average 43.

YOUNG IN FIRST (JUVENAL) PLUMAGE: Probably more streaked on lower parts, and with soft parts duller in color.

YOUNG IN DOWN: Compared with young of *Anas rubripes* or *Anas boschas* this species is

lighter colored all over. The sides of the head are paler, the dark area on the top of the head is more restricted, leaving a broad white superciliary stripe on each side, meeting in front to form a white forehead. The black streak between bill and eye is absent, or nearly so, and the postorbital stripe is narrow and paler colored. The downy tail-feathers are very light gray, instead of nearly black, and the two white rump-spots are somewhat more prominent.

Note: Examination of a very large series has convinced me that the so-called "Mottled Duck" of Sennett, *Anas fulvigula maculosa*, can no longer be considered a valid race. Specimens from the Vermilion Bay region of Louisiana are much darker and of a richer chestnut color, but this is without doubt due to stain. The cheeks of Texan birds are not differently streaked, and the greenish speculum of Florida birds is found only occasionally. The mottled appearance of the breast is characteristic of old, full-plumaged males, wherever the species occurs (see Phillips, 1912a).

DISTRIBUTION

THE Southern Black Duck is a local, semi-tropical species confined to the peninsula of Florida, and the Gulf Coast of Florida, Alabama, Mississippi, Louisiana and Texas. Its status is somewhat uncertain, because it is so frequently confounded with the Northern Black Duck (*Anas rubripes*) which also occurs in Florida and on the Gulf Coast. Either one or the other of these species may be found in Cuba (Cabanis, 1857; Cory, 1889) and in Jamaica (Cory, 1889; March, 1864; Gosse, 1847) but the tendency at present seems to be to reckon all the West Indian specimens as examples of the true Black Duck. According to Cooke (1906) the present species breeds in southern Florida and less commonly also in the northern part. He furthermore states that it seems to be absent from the northeastern sections though it is found in the northwestern parts of the State. The northernmost record seems to be Micanopy, in the interior, latitude 29° 30′ north (U.S. Biological Survey) though F. M. Chapman (1888) did not find it in that vicinity at Gainesville. Cory (1890) has recorded it from Banana River and the British Museum has specimens from Lake Hichpoochee. One or two are shot nearly every winter at the Canaveral Club, near Titusville. The species is said to extend south only to Eden on the east coast, latitude 27° 20′ north, but Mr. F. H. Kennard (*in litt.*) speaks of it as common south of Lake Okeechobee, and Dr. Thomas Barbour informs me that he saw one pair at Royal Palm State Park, twelve miles southwest of Homestead, and only a short distance from Cape Sable. Even at Cape Sable it has been found nesting in June (A. H. Howell, U.S. Biological Survey notes). During his many journeys through the Florida Keys Dr. Barbour says he never saw a single specimen. **Florida**

According to the U.S. Biological Survey the southern limit of its ordinary range on the west coast of Florida is Fort Myers, latitude 26° 40′, and Scott (1892) speaks of it as common at Lake Flirt in the same Caloosahatchie region. Baird, Brewer and Ridgway (1884) have recorded it from Sarasota and it is common at Old Tampa Bay (Scott, 1892). On the west coast it extends north to Tarpon Springs, where it is not common (Scott, 1892). There is one record for western Florida, at Whitfield (U.S. Biological Survey). Brewster and F. M. Chapman (1891) have reported it questionably from the Suwanee River. On the whole the species seems to be most common on the east coast, and it is generally supposed that most of them breed in the interior where they are less likely to be disturbed (U.S. Biological Survey). Mr. Griscom of the American Museum informs me that local breeding ducks, almost certainly of this species, are common at St. Marks, northwestern Florida. The species has not been recorded from the coasts of Alabama or Mississippi but it undoubtedly occurs there.

Specimens that have been recorded under this name from Kansas, Colorado, New Mexico, etc., are probably to be referred to the New Mexican Duck (*Anas diazi novimexicana*) recently described by Huber (1920).

It is a common species in Louisiana, and breeds there abundantly (Beyer, 1900). One or two observers think it may leave the State in winter, but the evidence overwhelmingly shows that the birds are resident in Louisiana as in Texas, since they are met with at all times of the year in both States. According to the U.S. Biological Survey the species is found in Louisiana from Belle Isle, Abbeville and Lake Arthur west along the littoral of the Gulf of Mexico. McAtee (U.S. Biological Survey) says it is a common resident in the Vermilion Bay region and he has recorded it from Grand Chenier and Gum Cove, as a winter bird. At Cameron he says it is abundant in November and December. In four or five days' shooting in the Vermilion Bay region in January, 1913, I saw hundreds of these birds and shot ten or fifteen. It is important to note that so far nearly all records for this State are from the coast. I know of no specific records for the northern sections, but Beyer, Allison and Kopman (1907) say that in winter its numbers are largely increased and that it may be found on lakes even in the northern part of the State.

Louisiana

In Texas the present species seems to be abundant all along the coast from the Louisiana boundary to the mouth of the Rio Grande (U.S. Biological Survey), but it is absent in the northwestern areas of the State. The only interior records are those for Waco and Mason (U.S. Biological Survey). Strecker (1912) states that it is very rare in the central areas. On the coast it is, as I have said, abundant, from the Louisiana frontier at Sabine (Lloyd, U.S. Biological Survey), at Bolivar (U S. Biological Survey), at Matagorda and at Rockport (McAtee, *ibid.*), most of these being winter records. In the southeastern section, the species is commonly found and is widely distributed. It has been taken at San Antonio in summer (Dresser, 1866; U.S. Biological Survey), and small flocks of this or the New Mexican Duck were seen near there in winter (N. C. Brown, 1882), and at Corpus Christi it is common (British Museum; Sennett, 1879). On the Nueces River it is a common bird in summer as in winter, and it has been known to breed in this vicinity, as in San Patricio, Refugio and other southeastern counties (Strecker, 1912; Lloyd, U.S. Biological Survey). These ducks are said to be common also on Padre Isle, in August and in November (Lloyd, *ibid.*), and they have been taken at Point Isabel in May (Sennett, 1879). Merrill (1878) states that a few breed at Fort Brown, on the lower Rio Grande, though it does not seem to occur south of the Rio Grande, unless the specimen recorded by Emmet (1888), from Chihuahua, Mexico, really belongs to this species. Other Texan records for *Anas fulvigula* are those of Howell (U.S. Biological Survey) for High Island, where it was common in February, and of Simmons (1915) for Pierce, where the birds were breeding.

Texas

Chihuahua

Broadly speaking this is a coastal species, essentially non-migratory, but it may be found to disperse inland during the breeding season. Its limits in the interior are, however, very imperfectly known.

GENERAL HABITS

HAUNTS. In Florida, although found throughout the lake regions, this duck is more common on or near the coast, on fresh and brackish water. Dr. Thomas Barbour, who has done extensive collecting in Florida, noticed it in maximum abundance around the edge of the Everglades, often in small pond-holes hollowed out by alligators. He found it far less common on Lake Okeechobee, though he saw a few on Pelican Bay, at the south end of the lake. At the head of the Pompano Canal, north of Miami, and seven or eight miles from the coast, they were more abundant than in any other place that he visited. They are birds of the open swamps and so-called "bonnet marshes," where the yellow water-lily, on whose seeds they feed, grows in abundance. They are seldom seen on wooded ponds among live oaks, which the Carolina Duck (*Lampronessa*) prefers. Occasional pairs are scattered through

MAP 30. Distribution of Florida Dusky Duck (*Anas fulvigula*)

ponds in the open pine woods, but the so-called "piney woods" are not their usual habitat. In his many journeys throughout the Florida Keys in both summer and winter Dr. Barbour never saw a single specimen. On the west coast of Florida a correspondent quoted by Baird, Brewer and Ridgway (1884) found them in August, September and the first part of October, in parties of from five to twenty, leaving the fresh ponds and flying across the bay to the sandbars on the inner side of the Keys, where they spent the night on the pools or coves near the mangroves, returning at sunrise next morning. At that time the birds shot were all males, but in January, February and March, mated pairs spent the night in the same manner. I myself noticed nothing characteristic in the winter habits of the Southern Black Duck as seen in Vermilion Bay, Louisiana, in January. They were certainly a common species, easily distinguishable from northern Black Ducks by their buffy heads and lighter under parts, and they outnumbered the northern migrants by about twenty to one.

Wariness. The Southern Black Duck is a shy bird but I gather that it is not quite so wary as the true Black Duck. Personally I could not see that these birds were much tamer than northern ducks, at any rate during the shooting season in Louisiana. In the early spring in the Everglades I have seen the male of a mated pair return constantly to the very spot where his mate was shot.

Daily Movements. Their daily movements do not differ from those of Mallards. They are more active in the evening, and might be termed crepuscular.

Gait, Swimming, Flight. There is nothing in the gait or swimming habits of this species to distinguish it from the Mallard or the Black Duck, though it might be said that on the wing it has a somewhat more slender outline, and is noticeably smaller. They are probably never found in large flocks and are seen more or less in pairs throughout the whole year. Dr. Thomas Barbour tells me that he once saw a flock of forty, but companies of more than ten or fifteen he regards as unusual.

Association with other Species. Within the range of this species in Florida there are not many northern migratory ducks except Lesser Scaups, Mallards, Teals and Carolina Ducks. Southern Black Ducks are said to associate but rarely with any of these. In the Vermilion Bay region of Louisiana, where the marshes are populated by enormous numbers of Mallards, Pintails, Teals and Shovellers, I usually saw these ducks flying in little parties by themselves. In that region some of them pair and nest very early in the spring or even in late winter, so that many of them probably withdraw from the large marshes long before most of the northern migrants have left.

Voice. The voice is very similar to that of the Mallard or the Black Duck, if

not indistinguishable. Dr. Barbour tells me that he never noticed any difference, and Cory (1896) is of the same opinion. Harper (U.S. Biological Survey) speaks of the note as similar though perhaps not so loud as that of the Black Duck. Green, another Government collector, describes the note as slightly different from that of the Black Duck, and resembling *hek-hek-hek-hek*, quickly uttered. From the observations which I myself made on birds in confinement and also in the field, I must confess that I never noticed anything characteristic in the voice. But these ducks are as a rule very silent, more so even than Mallards in the wild state.

Food. A series of fifty-one stomachs of the Southern Black Duck was examined by McAtee (1918) and forty-eight were used in tabulating the percentages of various foods. These specimens were collected from November to April in the Everglades, and the river marshes of Florida, the coast marshes of Louisiana, and the coastal lakes and lagoons of Texas. The food is similar to that of the Black Duck but includes even more animal matter. In fact 40% of the entire diet is of this nature. It thus consumes 15% more animal matter than the Black Duck and about 30% more than the Mallard. This is doubtless due to the fact that the habitat of the Southern Black Duck is subject to almost no cold weather so that animal life is abundant throughout the winter. Almost half of the vegetable food consists of various grasses, including the root-stocks, stems and leaves. Of the grass seeds consumed, waste rice gleaned from the rice-fields is most common. Probably in the summer the growing rice crop may be resorted to, at least these ducks are said to be destructive to growing rice. The seeds of smart-weed comprise 9.54% of the total diet. No fewer than 800 seeds of prickly smart-weeds (*Polygonum sagittatum*) were taken from one stomach. Seeds and tubers of sedges compose 6.34%, while seeds of water-lilies and coon-tail make up 3.11%. Seeds, stems and foliage of pond-weed and widgeon-grass are in the proportion of only 1.6%, while bayberries and seeds of buttonbush were also found. The principal animal food consists of shell-fish, which form nearly 27% of the whole diet and includes snails, some nearly one inch in diameter; insects, including dragon-fly nymphs, waterbugs, caddis larvæ, beetles, and flies, even horse-fly larvæ. Crustaceans comprise 2.77%, and small fishes 2.54% of the whole diet. The stomach of a male taken by Harper (U.S. Biological Survey), in eastern Florida, contained 99% of smart-weed.

Courtship and Nesting. The breeding season of this species is undoubtedly more irregular than in northern ducks and covers a greater period of time. A male killed by Harper (U.S. Biological Survey) on January 30 had large sex organs, and Dr. Thomas Barbour has heard of flappers being seen on Banana Creek, Indian River, early in March. Much earlier dates which I can only regard as very unusual were recorded by McIlhenny (1916) and also in a letter to me. He reported nests

in October, both among wild birds and among pinioned individuals on his own ponds. At Abbeville, Louisiana, on the State game preserve, J. W. Trahan (U.S. Biological Survey) saw a brood about a week old on November 22, 1916!

Southern Black Ducks are more or less paired all winter, and doubtless occasionally nest as early as late February, for downy young have been seen on the Wakasassa River, near Guntown, Mississippi, as early as March 25 (U.S. Biological Survey). There are various records for March. Baird, Brewer and Ridgway (1884) quote their correspondent, Moore, who says that in Florida these ducks hatch throughout the month of April. Scott (1892) states that they nest late in April which certainly seems somewhat late for the bulk of the birds. Near Houston, Texas, many young begin to fly by late May. Audubon found a nest on April 30 on Galveston Island, Texas. Many others seen at that time were undoubtedly breeding.

A study of the display in this species would be very interesting in order to determine whether it resembles that of the Mallard. Those that I have kept in confinement never mated or laid eggs, though the males readily crossed with female Mallards.

The nest is always placed on the ground in drier portions of the marshes and often in low grass (Maynard, 1882). A nest described by Baird, Brewer and Ridgway was carefully screened from view on all sides, and so canopied by the standing grass that the eggs were not visible from above. Davie (1898) mentions a nest in Louisiana which consisted of a foundation of rushes and was placed on top of an old muskrat house. Another nest, which would seem to be unusual, was found in a small prairie pond near Houston, Texas (Simmons, 1915). The pond was nearly covered by tall grass and rushes, and the nest was eight inches above the water in thick grasses where the water was four inches deep.

The normal clutch contains from eight to ten eggs, though as many as fourteen seem to have been found (Cory, 1896). Maynard (1889–90) fixes the clutch at six to eight, which is probably more nearly the average. The eggs resemble those of the Black Duck, but are of a lighter shade of greenish white (Cory, 1890a; Baird, Brewer and Ridgway, 1884). In Louisiana one clutch averaged slightly smaller than those of the Black Duck, measuring 2.14–2.25 inches by 1.53–1.60 (Davie, 1898). Eggs taken in Florida show little divergence in size from those of the Black Duck, measuring 56–58.5 mm. by 33–34.3 mm. (Maynard, 1889–90).

It would be of great interest to know whether the male stays with the female longer than in case of the Mallard. I should not be surprised to find that such is the case. A male bird was found near the vicinity of the nest on the twenty-fourth day of incubation (Baird, Brewer, and Ridgway, 1884) and Maynard (1882) while he was engaged in catching some downy young, noticed a male who responded to the loud quacking of the mother duck. This male approached to within fifty feet of the observer.

STATUS. An estimate made by Harper (U.S. Biological Survey) places the probable number of Southern Black Ducks in the eastern half of Florida from Okeechobee north, at 5000. The species is more uncommon on the west coast at Tarpon Springs (Scott, 1888), but was very plentiful in the Caloosahatchie region (Scott, 1892). Maynard (1882) considered it remarkably abundant on the Indian River. Cory (1896) spoke of it as becoming rare in many localities where once common. Mr. F. H. Kennard informs me that in the area south of Lake Okeechobee, which he recently traversed, these ducks were comparatively common in districts difficult of access. He adds (*in litt.*): "From what I know by hear-say I should say that this duck is not holding its own. In Florida, the people, both natives and visitors, go around with guns and shoot about everything they see." The recent very extensive drainage operations in the Everglades can scarcely fail to affect the status of this species and to concentrate those birds which have been displaced from more favorable areas. The future of these birds is far from promising if agricultural development proceeds as rapidly as it does at present. Two places where they are still really abundant, according to Dr. Thomas Barbour, are in the chain of ponds due west of Lake Worth, and at the head of the Pompano Canal. Prairie fires which are often set in order to improve the pasture in the pine barrens of Florida are said to be destructive to these ducks during the nesting season (Baird, Brewer and Ridgway, 1884). Elliot (1898) was of the opinion that the species would not hold its own in Florida.

On the coast of Louisiana, in McIlhenny's opinion (1916), this duck is on the increase, and the recent enactment of the Federal Migratory Bird Law, together with the establishment of the Marsh Island and Rockefeller Bird Sanctuaries, cannot help being a valuable factor in increasing its numbers locally. Extraordinary estimates of the actual numbers of pairs breeding in a given area of marsh in the Vermilion Bay region have been sent in to the Biological Survey. Some of them are so high, 100 pairs on 200 acres, that they can hardly be taken seriously, but they do point out the thriving condition of the species on the coast of Louisiana.

DAMAGE. McAtee (1918) was informed by natives of Louisiana that Southern Black Duck are sometimes destructive to growing rice on the Gulf Coast of Louisiana, but on the other hand he found them eating the so-called "red rice" and other waste rice during the winter months, a habit which might tend to have a beneficial effect.

FOOD VALUE. Judging from the specimens I ate in Louisiana I should say that the flesh of this duck equals that of the Mallard. I am told that the same is true of birds killed in eastern Florida, but Hoxie (U.S. Biological Survey) remarks in his field notes that the flesh is likely to be muddy-flavored. Kopman (1921) considers the flesh inferior to the Mallard's.

HUNT. This species is not sufficiently abundant in any one area to be profitably hunted with decoys or blinds. Specimens are usually taken by still-hunting, or by pushing about in canoes.

BEHAVIOR IN CAPTIVITY. Southern Black Duck seem never to have been exported to Europe, probably because they are not ornamental. But in America they are occasionally kept. I obtained three or four from the late Wilton Lockwood some fifteen years ago. A few years since, Mr. McIlhenny sent me several pairs from Avery Island, Louisiana. They never nested, but I crossed the males with Mallard Ducks in a hybridizing experiment, the object of which was to determine the amount of Mendelian segregation in the second generation. It may be of interest to note here that the first cross produces hybrids very much lighter-colored and more Mallard-like than the Black Duck × Mallard crosses. In fact this species behaves in a genetic sense as if it were a Mallard with the male characters dropped out, rather than like a Black Duck. Moore (*fide* Baird, Brewer and Ridgway, 1884) possessed seven birds which he had hatched out under a hen. Even in the third summer he did not succeed in breeding them, though they were in their native climate. McIlhenny, however, is said to have bred them on a large enclosed pond. He crossed many with Mallards, apparently with the idea of producing a local strain of the latter duck.

My birds stood our northern winters as well as other water-fowl and seemed no more delicate than common Black Ducks or Mallards.

BLACK DUCK

ANAS RUBRIPES BREWSTER

(Plate 23)

SYNONYMY

Anas obscura Gmelin (*nec* Pontoppidan, 1763), Linné's Systema Naturæ, ed. 13, vol. 1, pt. 2, p. 541, 1788.

Anas boschas, var. *obscura* Lesson, Traité d'Ornith., p. 634, 1831.

Anas obscura rubripes Brewster, Auk, vol. 19, p. 183, 1902.

Anas rubripes Dwight, Auk, vol. 26, p. 422, 1909.

VERNACULAR NAMES

English: Dusky Duck, Black Duck or Black Mallard, Red-legged Black Duck, Spring or Winter Black Duck, Black Stock Duck.

French: Canard noir.

German: Düstere Ente, Dunkle Ente, Schwarze Stockente.

Spanish: Pato triguero.

Mexican: Xomotl.

DESCRIPTION

ADULT MALE: General color deep brownish black, all feathers edged with pale buff, or buffy gray. Top of head black, the feathers more or less edged with buff. Cheeks, chin, throat and upper neck buff-colored, streaked more or less heavily with blackish. Chin and throat sometimes nearly immaculate, at other times very dark; through the eye an irregular darker stripe. Speculum of the wing brilliant purple as in the Mallard, but framed anteriorly with a black band composed of the tips of the greater coverts, and posteriorly by another black band formed by the ends of the secondaries. A narrow white band, sometimes almost obsolete, is present on the tips of the secondaries. Axillars and under wing-coverts white. In full-plumaged old birds there is often a bronzy-green cast to most of the feathers of the upper surface, the rump may have greenish or blue reflections, and the central tail-feathers sharp points, or even slightly upturned ends. Slight tinges of metallic green on the back of the head or behind the eye are not uncommon. The feather edges on the breast are often darker than on the abdomen and the tertials become gray.

Iris dark brown. Bill greenish yellow to clear yellow. Legs and feet orange red to brilliant coral red.

Size same as the Mallard: wing 265–292 mm; bill 52–58; tarsus 44–48.

Weight 2 pounds 8 ounces to 3 pounds 12 ounces (1.13 to 1.70 kilograms). Specimens over 3 pounds 8 ounces are uncommon; average of males in late autumn in extra-fine condition may be as high as 3.2 pounds but is usually just under 3 pounds.

ADULT FEMALE: Similar to male but slightly smaller. Bill darker and more olive-colored, mottled on culmen. Legs and feet greenish yellow to dull orange. This sex can usually be told in the field by the darker bill and smaller size.

BLACK DUCK

Weight 2 pounds 7 ounces to 2 pounds 15 ounces (1.10 to 1.33 kilograms) — the maximum weight recorded once by myself. Average of females taken late in autumn in extra-fine condition is sometimes as high as 2 pounds 12 ounces (1.24 kilograms), but this is very unusual. A very remarkable specimen, weighed and sexed by Mr. W. S. Brooks in December, 1922 (Tuckernuck Island, Massachusetts), went to 3 pounds 4 ounces.

First (Juvenal) Plumage, both Sexes: Legs and feet not so richly colored; lower surface more streaked; chin and throat not so heavily marked. Upper surface somewhat lighter colored, especially on mantle, but not constantly so. Tail-feathers blunt. Sexes alike except for clear greenish bill in male, and mottled bill in female. The bill is always a distinguishing mark if examined immediately after the bird is shot. Color change often sets in within a few minutes and may soon obscure the sex differences.

Young in Down: Same as Mallard.

DISTRIBUTION

Any attempt to define accurately the range of the present species is involved in much difficulty. This is caused by the failure of local observers to distinguish the present species from *Anas fulvigula* of Florida and Texas, and the recently described duck from New Mexico, *Anas diazi novimexicana*. The two races of Black Ducks, *A. rubripes rubripes* and *A. rubripes tristis*, are here treated as one.

Breeding Range

Essentially an eastern species, the Black Duck nests not only in the northeastern United States and eastern Canada, but also west of James Bay and Lake Superior In the South it is said that Black Ducks have nested at Narrows Isle and Currituck Club marshes, North Carolina (G. B. Grinnell, *in litt.*), but in spite of repeated statements to this effect the most recent writers on this district (Pearson, Brimley and Brimley, 1919) do not appear to be convinced. At Pea Island, North Carolina, however, the species has evidently begun to breed in some numbers on an artificial pond. Many were seen in spring and in early August (1920), when some seven hundred to a thousand were counted there (Gould, *in litt.*), so that I feel certain of the evidence for this State. Besides this I have heard of others breeding on the west side of Pamlico Sound in Hyde County. In Virginia the species has bred in the coast regions at Wallop's Isle, Warwick County, and on the James River (H. H. Bailey, 1913), as well as on Pope's Isle (Whealton, *in litt.*). According to Cooke (1906) it has nested in Maryland at Ocean City and Barrow Springs. Whealton (*in litt*) gives Middlemeer as another locality. It breeds rarely in Delaware (Cooke, 1906; Rhoads and Pennock, 1905) and sparingly though regularly along the coast of New Jersey, from Ocean County to Cape May County (W. Stone, 1909; Harlow, 1918). Excepting on or near the coast, however, its breeding range probably does not extend south of 40° north latitude.

Middle Atlantic States

Its westernmost occurrences as a breeding bird in the United States have been undetermined because of uncertain records for Nebraska and Kansas. In these States it was said to breed sporadically, but the records, as well as several for Colorado, are probably to be referred to *Anas fulvigula* or to the New Mexican Duck, rather than to stragglers of the present species (Felger, 1910; W. L. Sclater, 1912). The same is very likely true of records for Utah and southeastern Wyoming, as reported by Brackett (1877). Recently Black Ducks, properly identified, have been found in Walsh County, northeastern North Dakota, as late as April 10 (Oberholser, 1918), and this State may yet be included in the breeding range. Reagan (1908) killed a specimen on the Rosebud Indian Reservation, South Dakota, and one of Mr. Osler's ducks, banded in Ontario, was taken near Hudson, South Dakota, October 21, 1921. They have been seen in northern Minne-

Middle West

though less commonly in the western parts (McIlwraith, 1894). Raine (1892) found it nesting at Peterboro, and Young (*fide* J. and J. M. Macoun, 1909) at Brockville. C. W. G. Eifrig (1910) regards it as a common breeder at Ottawa, and it breeds very commonly on the famous Long Point Marshes on the north shore of Lake Erie. A few breed in western Ontario (Saunders, *fide* J. and J. M. Macoun, 1909).

Still farther west, however, the species becomes rare. On Hudson Bay it has been taken at York Factory by Blakiston (*fide* Baird, Brewer and Ridgway, 1884), and even at Fort Churchill two specimens were recorded by Preble (1902). In that region it had already received a local name to distinguish it from the Mallard, and Mr. Preble tells me that he believes there is a considerable breeding area along the west shore of Hudson Bay. The Post Manager of Albany Post writes that it breeds along the west shore of James Bay in the vicinity of his post, and still farther north I have evidence from the Manager of York Factory who was told by the Indians that Black Ducks summer and rear young both north and east along the coast from that station. It may breed in limited numbers in the region between York Factory and Lake Winnipeg. In Manitoba, however, it is a rare breeder (J. and J. M. Macoun, 1909) and probably does not occur much west of Red River. According to E. E. Thompson (1891) it nests rarely about Lake Winnipeg, Long Lake and in the Red River valley, but is rare in western Manitoba. Taverner (1919a) has recently recorded an instance of its breeding at Shoal Lake, near the south end of Lake Manitoba, while Cooke (1906) gives as exceptional records, Lake Manitoba, Long Lake, Delta, and St. Marks in the same region. Job (1913) who collected many ducks' eggs at the south end of Lake Manitoba, saw but one Black Duck in the breeding season, and his guide told him that in the past twenty-five years he had shot only six. Seton (1908) gives three records for Shoal Lake and one for Lake Manitoba, and says it abounds on the Athabasca River! I do not know what the last statement is based on; neither am I able to explain MacFarlane's (1908) statement that hundreds are seen at Cumberland House and Fort Chipewyan, and that the species is not uncommon on the Anderson River! There is one summer record for Fort Anderson but I have never found the specimen. Preble (1908) was told that it occurred occasionally at Fort Simpson, on the upper MacKenzie River!

Central Canada

Recently a single specimen was taken as far northwest as Davidson, Saskatchewan (Report of Chief Game Guardian, Province of Saskatchewan, 1918, p. 11). The Factor of the Hudson's Bay Post at Nipigon told me that he had seen many Black Ducks in July at Red Lake on the English River north and west of Lonely Lake, and one hundred miles north of the Canadian Pacific Railroad. It is, however, worth noting that most of these extreme northern and western records may be summer transients, and not breeding birds. We know that ducks, and probably many other migrants, make northern excursions well beyond their breeding ranges in mid- or late summer. In this connection, a letter from Mr. Jabez Williams, a Factor for forty-four years in the Hudson's Bay Company and now residing at Fort Hope, on the Albany River, is significant. He writes that in his long experience in all the country north of Lake Superior he has never seen or heard of a flock of young Black Ducks, although adults are common in such places as Lac Seul, Lake St. Joseph and Ebamêt Lake. I have seen plenty in the Nipigon region myself, but it seems to me still unproved that any *great* breeding ground exists west of James Bay.

Winter Range

In the cold season the Black Duck is practically confined to the United States. Schmitt (1904) states that a few are found in winter on Anticosti Island, and according to Chamberlain (1887) a few winter in the Bay of Fundy. In some winters Black Duck are not uncommon in Nova Scotia (Tufts, 1918). In the St. Lawrence valley a few pass the cold season at Quebec (Dionne, 1906) and individuals are seen as late as December at Montreal (Wintle, 1896). In a general way I think it may be said that the species winters in some districts north to 45° north latitude.

Eastern Canada

freeze, I found that three-fourths of these ducks were males, the females having probably gone along before.

We obtain other evidence of the western-bred Black Ducks from various specimens shot in Alabama and Arkansas, North Dakota and other western points, which seem to be mostly of the *rubripes* type. It also seems to me that these "Red-legs" go farther south in winter than the eastern "Green-legs," although of course over the greater part of the winter range both forms mingle together. There is a good deal of evidence that the "Red-leg" form has been growing more plentiful in the southern States. But we need especially to know whether any typical "Red-legs" ever reach points like Anticosti and the Magdalen Islands, and whether any typical "Green-legs" breed in the Lake Superior and James Bay regions.

Being a hardy species some winter as far north as the St. Lawrence, or at least they leave there very late. They have been seen as late as November 14 at Montreal and as late as December 8 at Prince Edward Island (Cooke, 1906). They are said to remain occasionally on Anticosti in winter (Schmitt, 1904) and many winter in Nova Scotia and Maine, wherever salt-marshes are found. Local-bred ducks may be induced to remain until frozen out if properly baited; that is, one can delay their departure several months.

The spring flight is very different from that of the Mallard, for the Black Duck swarms up the coast, and into all the flooded valleys as soon as the ice breaks. They arrive in central New England just as early as weather permits, from early March to April, and they reach Maine about April 7, Montreal, April 14, Quebec, April 18 and Prince Edward Island, April 23. Meanwhile those ducks that have remained all winter with us on the coast, and are presumably drawn chiefly from the Northwest, do not appear to change much in numbers, but break up and depart a long time after migrants from the South have scattered all over the country. Of course it must be borne in mind that the species is practically confined to the coast in winter.

Sporadic Records: There have been many sporadic records for Black Ducks in the West, chiefly from Wyoming, Colorado and Utah, which are probably to be referred to the New Mexican Duck, *Anas diazi novimexicana*, or possibly to the Florida Duck, *Anas fulvigula*. There is one undoubted specimen for California, but Dr. Joseph Grinnell informed me that there is a possibility that this may have been an escaped bird. At any rate the Black Duck is said to occur occasionally on passage in Kansas (Bunker, 1913; H. Harris, 1919), in Nebraska (Swenk, 1905), in Missouri (Widmann, 1907) and in Iowa (R. M. Anderson, 1907). A number have been shot near Tulsa, Oklahoma, since 1918 (T. J. Hartman, *in litt.*). The specimens which I have examined from mid-western States (Indiana) and from Wisconsin, as well as the one reported by Oberholser (1918) from North Dakota, are typical of the Red-legged race. Mr. L. C. Pettibone of Dawson, Kidder County, reported a real flight there in 1914. There are also records of Black Ducks from the Valle de Mexico (Villada, 1891–92) and the west coast (Sanchez, 1877–78). These undoubtedly refer either to the Mexican or to the Florida Duck.

GENERAL HABITS

Haunts. The Dusky or Black Duck is not at all particular about the nature of the country it inhabits, but it likes to stay somewhere near the coast, even in the breeding season. Throughout New England it is found in summer in much the same country as the Carolina Duck, on slow-moving brooks, the marshes of our sluggish rivers, and old mill-ponds. Brewster (1884) thought that on the Magdalens, Anticosti and the north shore of the Gulf of St. Lawrence, they bred a short distance only from the coast. They have great gathering-places in the late summer, such as the

huge sound at Tabisantack, New Brunswick, and Merrymeeting Bay on the Kennebec River in Maine. They seldom attempt to feed on crops, indeed there is little grain country within their range, but they do resort to upland pastures in late summer to obtain blueberries.

This is the characteristic duck of our tidal marshes. It feeds all along the narrow ditches and drains at low tide, and at high water it drifts about, waiting for the tide to fall, or flies inland for fresh water. In winter it seems to be able to get all the fresh water it needs from small trickles of brackish water which seep out under the banks in tide-creeks.

Wariness. Without doubt this is the wariest of all the duck tribe. Particularly intelligent and alert are those that winter along the thickly settled coast of Massachusetts, Rhode Island, and Connecticut, and the shores of Long Island Sound. Here they live in continuous contact with man, yet although formerly shot at, day and night, during the whole winter, and even into the spring, they managed to hold their own remarkably well. In Plum Island Sound between Ipswich and Rowley, Massachusetts, there were, as nearly as I could estimate, about three thousand Black Ducks regularly wintering. Twenty years ago there were two market gunners left who shot from floats at night, and in the daytime during easterly gales. These two men together took perhaps six hundred ducks between them during the whole season, and the numbers taken by all other shooters combined were insignificant.

The local wintering Black Ducks never become at all tame except when the marshes accumulate a thick covering of ice and snow, and the exposed mud is greatly restricted. Then they have to gather in a few places where the current has kept open holes, and being in poor condition they soon lose nearly all of their natural acuteness.

Black Ducks are not naturally wild. The young are extremely tame until shot at. I have decoyed them in the marshes of James Bay by simply squatting down in the grass, waving my hat in the air and giving a few quacks. If they are really let entirely alone, they remain extremely tame all summer; but one day's shooting is sufficient to educate them almost completely. I sometimes think that the more guns that turn out on the opening day, the better it is for the ducks.

It is not difficult to tame Black Ducks under certain conditions. In a small cement pond in Franklin Park, Boston, Mr. Morse, of the Boston Zoölogical Park, fed about seventy-five Black Ducks during the hard winter of 1919–20. These became so tame that he could, and did catch a number in his hands without the use of any trap. The following winter (1920–21) which was very open and warm, he was not able to repeat this performance.

It is remarkable that the "Red-leg" type (*Anas rubripes rubripes*), as seen on our New England coast, is very much afraid of live decoys, especially if they quack

loudly, and the most successful gunners do not use them at all. The same thing is seen when a flock of these local wintering ducks comes into a pond where there is a shooting-stand. But the flight ducks of September and October are very tame in comparison. I have seen Black Ducks come back to live decoys a second time after being shot at. I have also once or twice seen ducks that would not fly when a gun was shot close to them. I once saw a Black Duck shot by rowing down upon him with a boat in the open water of a lake. With these early autumn migrants it is often possible to shoot several out of a flock, one after the other, with a 22-caliber rifle, if the wind is blowing toward one. Several times wild Black Ducks have followed live decoys right up to the door of a shooting-stand, and I have even found ducks inside the stand sitting on the decoy coops, when no live decoys were anchored outside. O. W. Knight (1908) has known of Black Ducks that so gorged themselves with huckleberries in late August that they went to sleep under the bushes near the water. One which he found in this condition was unable to fly away!

Every one who has shot in the sounds of North Carolina and Virginia knows how much tamer Black Ducks are there, even where many of them are "Red-legs." Why this should be I do not know, except that of course where enormous numbers are present, ducks do seem to be less alert. On the other hand, writing of Minnesota, Hatch (1892) remarked that a single one in a flock of Mallards proved a sad defeat to the sportsman's purpose. In Michigan late flights of Black Ducks at Sheldrake Lake were noted for their wildness (Birdseye, U.S. Biological Survey field notes).

In Massachusetts, Herring Gulls and even Black-backed Gulls may sometimes act as sentinels when Black Ducks are sleeping on a beach, at least so Mackay (Auk, vol. 9, p. 223, 1892) thought.

It is remarkable that noises such as gun-shots do not disturb Black Ducks at night at anything like the same distance that they do by day. The birds seem more confident and rely upon the darkness for protection.

I have perhaps created an impression by the foregoing that the Black Duck is not a particularly wary bird. This is not so. No duck can compete with this species on equal terms, except perhaps the Pintail. Mallards, at least as we see them in North America, are certainly tamer.

Daily Movements. This species probably does not differ by nature from the Mallard, although it appears to be more nocturnal. The early-flight birds are not nocturnal, and those following the coast respond regularly to the rise and fall of the tide. In summer and early autumn the species is crepuscular. In winter it becomes entirely nocturnal, spending the whole day outside the beaches if the wind is off shore and coming in to the marsh only when the sea becomes too rough; and it is truly remarkable what wind and wave this hardy species can ride out. Under the old conditions, that is, when shot at every night, almost no ducks remained in our

salt-marshes after the first streak of dawn; but now their habits are somewhat modified, and when they are not too much harassed in the daytime, some will remain on the marsh.

On fine moonlight nights our wintering New England ducks come in long after dark as they have no difficulty in filling their crops, but in cold rough weather they start much earlier, even before sunset. The ideal conditions for wintering Black Ducks may be seen in our park lakes about Boston, up to the time these freeze. Here we see thousands of ducks sitting about on the fresh water all day long instead of going to sea, and flighting out to salt-flats and marshes just at dark. This would happen everywhere along the coast if ducks were not disturbed.

Diving, Perching, Swimming. Young birds dive as in all the river ducks; old birds almost never, except to escape raptorial birds. I have twice seen single Black Ducks dive at the flash of a gun when shot at from a shooting-stand. Of course this is very unusual and it may be simply a wrong response to some definite stimulus. Anyway it shows that the trick can be done. Occasionally immature ducks may be seen splashing about in play in the early autumn and making short clumsy dives, as young Mallards do. Where ducks are artificially fed in shallow water I believe they can be taught to dive short distances. I have often baited in water over my knees, yet this grain was cleaned up almost immediately by a flock of Black Ducks that had been "using" this particular place for several months. In watching this flock through a glass it was difficult to see just how these dives were made, because there were hundreds of birds tipping, playing and splashing about in one confused mass.

This duck can dive from the wing, but I have never seen this performance. C. S. Allen (1893) saw one flying over a marsh, suddenly double up, apparently falling over and over, striking the water as if shot, after which it immediately dived. The action was in response to a Red-tailed Hawk flying over, but there was no such response to Fish Hawks.

Wounded birds dive cleverly and make straight for the nearest shore, often running back a long distance into the woods, where it is almost impossible to find them without a dog.

Black Ducks do not perch. They may roost on low stumps and rocks, and in very rare instances they have been found nesting in trees. The swimming posture is identical with that of the Mallard. They sleep either with head sunk down upon the breast, or with the bill tucked under the scapulars. On land they sometimes squat, but more often they stand either on one or on both feet.

Special Senses. I find I am in good company among those who see no evidence of a sense of smell in Black Ducks. I have spoken of the traditions in regard to this matter under the Mallard. C. W. Townsend (1905) and Forbush (1912) do not be-

lieve the species can smell man. However, nearly all old shooters are quite convinced that Black Ducks have this power, and Giraud (1844) tells how the gunners of Long Island burned tow in order to disguise their presence!

Flight. Everything which has been said of the Mallard holds for this species. Very large migratory flocks are unusual. As we see them on or near the Atlantic coast in early autumn the typical flock is of five or six to a dozen or fifteen, and less often thirty or forty. Migratory flocks of sixty or seventy I should call unusual. At least, such large flocks do not often stop in our eastern ponds although large bodies of birds may gather, the result of many small, probably family parties, temporarily combined. Audubon thought that it was unusual to see them in flocks as large as is customary with the Mallard.

Mated pairs flying about alone almost always show the female in front. When a pair is jumped, the female forges ahead as soon as the birds get well under way.

Black Ducks are easily recognized on the wing because they are so much darker than either the male or female Mallard. They have the same manner of flight as Mallards, that is, with a rather short wing-arc, the wings not depressed much below the level of the body. When they are mixed in with Florida Ducks they are also conspicuous by their darker color, especially about the head and neck.

Association with other Species. Black Ducks are usually seen by themselves while migrating in New England, but sometimes there will be a single Green-winged Teal, a Mallard or two, or a Pintail among them. In winter on our Atlantic coast, east of New York, this species has almost no other river ducks to mix with. Farther south and west they associate very freely with Mallards, and also with Pintails, and Teals, less often with Gadwalls, Widgeons and Shovellers. Early in the winter Mallards begin to draw away from the Atlantic coast, so that the association on common ground does not last long. The association of Black Ducks with Herrings and Black-backed Gulls was mentioned under Wariness.

Voice. Not to be distinguished from the Mallard's. The windpipe, described by Audubon and others, has a tracheal pouch similar to that of the Mallard.

Food. The food of this species in winter has been carefully studied by McAtee (1918). The result of the analysis of 390 stomachs from nineteen States and two Canadian Provinces is: animal matter, 24.09%, vegetable, 75.91%. Of the animal matter a little over half was made up of mollusks, mostly univalve shells. The common blue mussel is very important, and shells of the genus *Litorina* were frequently taken, five species being identified. Twelve hundred shells were removed from the stomach of one bird. Crustaceans are next in importance, and under this head come

barnacles, sand-fleas, water-fleas, sow-bugs, shrimps, crayfishes and crabs. As many as thirty small crabs have been found in one stomach. The other animal food consists of insects, aquatic beetles and bugs, dragonflies, especially in their immature stages, crickets, grasshoppers, caddisflies and their larvæ, winged flies, and ants. Fishes and their eggs are rare, and a few marine worms have been found.

The vegetable food (75.91%) is very like that of the Mallard, but not so varied. Three-fourths is derived from pond-weeds, eel-grass and wild celery. Leaves, stems, tubers, winter buds and seeds of pond-weeds are eaten. No fewer than 4000 seeds of eel-grass were taken from the gizzard and gullet of one Black Duck. The grasses and sedges compose 11% of the diet, and of less importance are the smart-weeds, burr-reeds (*Sparganium*), water-lilies, coontail, wapatos, pickerel-weed, huckleberries, etc.

A few stomachs of downy young show that these consume from 40 to 79.25% of animal food, much more than adults, and this includes eggs of small fishes, caddis larvæ, etc. The vegetable food of the young showed no especial peculiarities.

The crops of two birds shot in winter in Maine contained the red berries of *Lepargarea canadensis*, a northern shrub not known in Maine (O. W. Knight, 1908). Eleven which I shot at Ipswich in September were crammed full of the two small species of snails, *Melampus lineatus* and *Litorina rudis*, and had nothing else. Audubon gives a long list of the diet: newts, young frogs and toads, tadpoles, all sorts of insects, acorns, beechnuts, grain, small quadrupeds, earthworms, leeches, and shell-fish, — a very complete account.

In the Magdalens in summer they are said to eat blueberries high up in the hills in company with the Hudsonian Curlew (Sanford, Bishop and Van Dyke, 1903), and O. W. Knight (1908) recorded similar habits in Maine. I found them feeding on blueberries on Martha's Vineyard Island from mid-August to mid-September, and they must have taken them at night; for these particular birds were gathered around the edge of a pond all day, their excrement showing absolutely purple in color. Later, on November 22, I collected stomachs from the same group of ducks. These were analyzed by the staff of the U.S. Biological Survey, and found to contain very diverse material, ranging from 100% to 0% vegetable, and from 80% to 0% animal matter. One stomach contained three fishes (*Fundulus*), 35%; remains of fishes, 40%; 650 seeds of *Scirpus* sp? (rush), 8%; 31 seeds of *Scirpus americanus*, 1%; 1 seed *Cladium* sp?, trace; and ground-up vegetable matter, 16%. The others contained various shell-fish: blue mussels (*Mytilus edulis*), broken up gastropods (*Litorina*, etc.), with seeds of *Cladium*, *Mariscoides*, *Potamogeton* and *Prosespinaca*.

I have seen Black Ducks feeding on acorns in a park near Boston in early April, and Dionne (1906), as well as Audubon, mention acorns as an article of diet.

The typical stomach from our salt-marshes in winter contains no vegetable matter, but is one mass of very small shell-fish, mostly gastropods (snails).

In spite of the great hardiness of Black Ducks and their ability to glean a diet from the frozen salt meadows where most ducks could not live at all, they do, during very hard winters, often starve in New England, or become mere skeletons, entirely unfit for food. Fortunately this does not occur nowadays during the shooting season, which ends in the north on December 31, so that they are no longer persecuted when in a helpless condition.

We now occasionally hear from extremists in the conservation movement, who would like to put Bob-whites as well as all weed- and insect-destroyers on the song-bird list. They might just as well include the Black Duck among "song-birds," for Eaton (1910), in his Birds of New York, tells of the stomach of a specimen, taken while returning from a flooded cornfield at Canandaigua Lake, that contained a total of 23,704 weed seeds! Of these 13,240 were pig-weeds, 7264 knot-grass, 2824 ragweed, and 576 dock seeds!

Courtship and Nesting. Black Ducks are not all paired in our parks about Boston until April. Of course birds at rest drift around in pairs by November and December, but as late as March 20 I have found considerable bodies of birds with a large excess of males, and apparently not more than half of them with mates. At such times one can see the courtship at its best, and it is very remarkable that its resemblance to, if not identity with the Mallard's, has seldom been noticed. In a group of twelve males and one female which I watched closely on March 20, 1920, at Chestnut Hill Reservoir, the actions were as follows: these males, who appeared to be in active competition, would run about on the ice, chasing and pecking at each other with their bills. Then they, including the lone female, would run to the open water where they would all "mill" about in a confused and excited mass, single drakes making short flights and chasing each other around in circles. These short display-flights were well described by C. W. Townsend (1916) and indeed this is the most conspicuous part of the performance, possibly connected with exposure of the white under-wing surfaces. A bobbing of the head, as in the Mallard, is also seen. But if one watches closely he will see the uprearing of the body and the down thrust of the bill just exactly as in the Mallard.

While these mating antics are going on I have heard the clear whistle-like note from the males, just like the Mallard's whistle and entirely different from anything I ever heard at other times of the year. Sometimes on a quiet morning in February or March this whistle can be heard several hundred yards away. But it is a fact that the display of the Black Duck is not so easy to see as it is in the Mallard, perhaps because this is a much more retiring species. I have seen pinioned birds mate with no particular ceremony beyond active bowing movements.

The nesting season varies from late April to mid-June, according to the season and the latitude. At Anticosti young have been found as early as July 3 (Verrill, 1862),

while Audubon found females still incubating in southern Labrador on June 17. By July 17 nearly all females had broods. In the Magdalens, eggs are deposited from late May to early June (Maynard, 1882), and in Minnesota from May 15 to 27 (Hatch, 1892). In eastern Massachusetts the average time of laying is early May. Extraordinarily early nestings were recorded by Game Warden P. K. Hilliard in New Jersey during the unusual spring of 1921. In a letter to Dr. T. S. Palmer of the U.S. Biological Survey, this warden described four nests with eggs along the west side of Upper Barnegat Bay on March 21 That same spring I saw a brood of ten young several days old near Plymouth, Massachusetts, on April 25, but this was wholly exceptional. There are, however, a good many early April nesting dates for southern New England, Long Island and New Jersey.

The nest is placed in a great variety of situations, nearly always on the ground, and near water, well hidden, and by no means easy to find, as the species becomes extremely secretive just as soon as the nest is built. Some unusual situations have been noted. One was recorded in the cavity of a leaning birch thirty feet above ground (Boardman, *fide* G. B. Grinnell, 1900), another on an island in the St. Lawrence River in an old Crow's nest situated forty-five feet above ground. Down was added to the original nest (Beaupré, 1906). The same writer found another Black Duck occupying the nest of a Red-shouldered Hawk in a bass-wood tree fifty feet high.

In Labrador they are said to nest chiefly on the out-reaching branches of stunted spruce trees, which are seldom higher than four feet, at least near the coast (Frazar, 1887; Davie, 1898). Samuels (1870) described one on a stump that overhung a small spring, a mile from any water, on the side of a hill.

Brewster (1884) found this duck nesting commonly in the immediate vicinity of the sea in the St. Lawrence region, and this is no doubt characteristic of all northern regions. The numbers that nest in the interior of Labrador are probably negligible. Even in the highlands of Maine and in the Adirondacks one could hardly call the Black Duck an abundant nester, and it is very greatly outnumbered in these regions by American Goosanders and Golden-eyes.

The clutch is like that of the Mallard in number and the eggs of the two species are indistinguishable as regards both size and color. The incubation period is from twenty-six to twenty-eight days.

Their early love for salt water is well shown by observations in Anticosti, where young only three or four days old were seen at sea (Brewster, 1884). Males stay near the females at least until incubation has started, in some cases until it is well under way, but we need definite data on this point. The male then retires to moult, and becomes absolutely invisible. It is only very rarely that one runs across a male when incapable of flight, although the females and young are much in evidence soon after the latter are hatched. Audubon found males moulting in Labrador July 4. He noticed that sterile females moulted much earlier than those with broods.

Young leave the nest very soon after hatching, in one case in the late afternoon when they were hatched in the morning (C. S. Allen, 1893). The female uses all the usual deceptions and tricks to lead one away from her concealed brood. It is not known just how long the female usually remains with the young flock but probably on an average she does not leave until they are half grown. Whether she rejoins her own brood later on, after her moult is completed, it is impossible to say. The late William Brewster seemed to think that this was probably the case. In his notes on the birds of Umbagog Lake he says that he has seen young no larger than robins going about alone.

Status. There is no doubt in my mind about a marked increase in Black Ducks since spring shooting was stopped in Massachusetts in 1908. The same is true of the species everywhere, and the Federal Migratory Bird Law, plus the treaty with Canada, has regulated the seasons both in the United States and in Canada. Besides this, all the large markets have been virtually closed. I could cite evidence on this increase by the page, but it is not necessary, and the facts are too well known to all New England sportsmen.

Up to about 1910, the local breeding ducks seemed everywhere to be growing less, and so also were the assemblies of birds upon the coast in August and September. And this was not all; for the early autumn flights of "Green-legs" were getting smaller and smaller. On the other hand the "Red-leg" type, the wintering ducks in New England, showed no change in numbers, and there is a good deal of evidence to show that the Red-leg form has been increasing and extending its winter range southward for twenty or thirty years at least; it may even be extending its breeding range west and north.

Brewster's Cambridge records showed that the Black Duck had not changed much in the past seventy-five years, that is, it had been a rare breeder for a long time. Wintle (1896) thought that it was likely soon to be a *rara avis* in eastern Canada.

Herrick (1910) writes that among the records of a club at Monroe, Michigan, at the west end of Lake Erie, the proportion of Black Ducks to Mallards has risen between 1885 and 1908 from about 14% to about 40%, a remarkable change. Before 1865 it was an uncommon bird there. At the north shore of Lake Erie, on the Long Point Marshes, nothing of the sort has happened, as it has always been very common there.

Mr. W. B. Mershon, a well-known authority on the birds of Michigan, writes me from Saginaw, that fifty years ago on the Saginaw River, then a paradise for ducks, his father considered the Black Duck a very rare bird and noted the fact if he shot two or three during the season, among many hundreds of Mallards. His informants tell him that on the Illinois River there were no Black Ducks forty years ago, and none in Wisconsin or Minnesota. He thinks the range is gradually extending west-

ward. At a small club, the Tobico Club, twenty-four miles from Saginaw and eight miles below Bay City on the west shore of Saginaw Bay, the records for 1913 to 1920 show that Black Ducks have risen from about equal numbers with the Mallard, to twice or three times as many. Shooting clubs along the Illinois River have noted a recent increase.

Forbush (1912) summed up what his field observers thought about this duck in Massachusetts in 1908. Forty observers reported an increase of the migrants and 126 a decrease (we do not know to what race this applies). Of the breeding birds 27 reported an increase and 83 a decrease.

Twenty-five and thirty years ago the Topsfield meadows of Essex County, Massachusetts, supported many breeding Carolina Ducks, but only a rare pair or two of Black Ducks. Now upon that same ground in wet seasons there are probably 300 ducks reared each summer.

An idea of numbers shot at certain points is always of interest in estimating the numbers of a species. This is best arrived at by consulting the books of the shooting clubs that have kept records over a long term of years. At Long Point, Lake Erie, Black Duck now represent 92% of the combined bag of Black Ducks and Mallard. They used to make up only 71%, but the Mallards have decreased. The number of Black Ducks shot in the open season (which lasts only about six weeks) runs as high as 3674, and in eleven different years between 1887 and 1903 over 2000 were killed each season. In eastern Massachusetts there are perhaps fifty shooting-stands which are "gunned" regularly for about two months of the season, besides numerous temporary "blinds." Placing 100 Black Ducks as an average for each stand (the numbers run from 20 or 30 up to about 300) we get a figure of 5000. Add to this the numbers shot by individuals in the salt meadows, and in brooks, pondholes, and fresh meadows all over the State and we can count on at least 10,000 in this small area.

At the Swan Island Club, North Carolina, the average number of Black Ducks killed each year from 1909 to 1916 is about 700; of Mallards 114. At the Currituck Club, twenty miles farther south, the average number for twenty-two years was 1158 Blacks and 547 Mallards (see Phillips, 1912).

Farther south, near Georgetown, South Carolina, Black Ducks are less in proportion to Mallards, perhaps only about 25%, but enormous numbers are shot there. A good many are taken at the Canaveral Club, near Titusville, Florida. The records of shooting-clubs are now of less interest since a bag limit of 25 ducks was established in 1918; that is, relative numbers mean less because many sportsmen will not shoot "common ducks" if they can get others. Taking our whole coast from Maine to Georgia, it would seem as if at least 200,000 Black Ducks were shot there yearly.

Audubon was told by his friend Bachman that this duck was becoming a much more common species in South Carolina in the early part of the last century, and this is

again very interesting in connection with the recent extension of range westward. Taking everything into consideration it is probable that no other species could have withstood successfully such constant persecution. No doubt this was only possible through the comparative wildness of all the northern and eastern sections of its breeding grounds. The Mallard has suffered a great deal more, comparatively speaking, although of course its actual numbers are much greater.

We gain a very accurate idea of the amount of artificial mortality which takes place during the shooting season from the return of banded ducks. This information may in time be of great value in setting aside sanctuaries and defining open seasons. For instance about 16% of those Black Ducks banded in Hancock County, Maine, are shot the same season. This is not as great a loss as is sustained by Mallards in the upper Mississippi Valley (Brownsville, Illinois). Those Black Ducks which were banded at Lake Scugog, Ontario, have always shown a lesser mortality, about 11%. These percentages refer to the first year, mostly the first few months after banding, for if a duck makes one journey to the south and back safely he seems well able to look after himself. In other words the per cent of returns after one year is remarkably small, for the shooter kills mostly young birds.

Food Value. This species is so dear to the heart of our eastern shooters that it is often put near the top of the list of ducks. I have eaten many which could not be improved upon. As a rule the young flight-ducks which reach Massachusetts late in September and early October are tender but not fat, and their flesh is lacking in "gamey" qualities. Most of them are still moulting. Later on they improve and the large November "Red-legs" are excellent. In places where ducks are regularly baited, and given a chance to rest in a protected pond, they put on a layer of fat and become very fine for the table. Black Ducks which feed on minute shell-fish in winter are often in good condition, but of stronger flavor, too strong for some palates, but just right for others. In the brackish sounds of North Carolina and in the abandoned rice-fields of South Carolina the flesh becomes even more delicious. The better condition and flavor of the late ducks which come from the West is no doubt due to their migrating by way of extensive rice-fields in the region of the Great Lakes. Those which come down our coast do not find any feeding conditions as rich as these.

The price per pair was from $1.00 to $1.50 in the eastern markets in Audubon's time. It was from $1.50 to $1.75 at the time our Boston market was closed, the local shooters receiving as their share from $1.00 to $1.25.

Enemies. Besides man and his weapons, we must now reckon the pollution of harbors and inlets by floating oil. This threatens to be serious in the near future. Many geese shot in Massachusetts in 1920 were covered with a black tar-like oil

which seems to be a residue thrown out from oil-burning ships. The bursting of oil tanks is said to have killed many ducks in a Rhode Island harbor. Wrecked oil-tankers have killed sea-birds of all kinds.

Fortunately the Black Duck is wary enough to escape most of his enemies. It would be interesting to know whether the great reduction in fur-bearing animals, mink, weasels, and the cat tribe, has made nesting easier for our ducks. Snapping turtles are destructive to young Black Ducks, and probably large pike account for a few. Audubon mentions gulls as enemies to the young in southern Labrador.

During certain winters eruptions of Snowy Owls occur in New England, and these birds are doubtless destructive to ducks on our salt-marshes. One taken at Block Island in November had the feathers of a Black Duck in its stomach (Deane, Auk, vol. 23, p. 290, 1906).

The Duck Hawk is too rare a bird in the east to be of much importance. The Goshawk probably takes a few. One was shot in the act of carrying off a live decoy in the Topsfield marshes in November (C. W. Townsend, 1920).

HUNT. Black Ducks are shot in many different ways on our east coast. When they are plentiful enough they may be shot over wooden decoys in rough or cold weather, but they soon learn to avoid such crude deception. If the decoys are made of rough cork, or even of seaweed bunches, or canvas sacks, they will work better, because they do not shine. More effective, and almost indispensable in many places, are live call-ducks. These are used either at temporary stands or at permanent camps on the shores of ponds where a "team" of them is kept in front of the blind, day and night, during the whole season until the pond freezes. Many of these camps are now elaborate affairs. Permanent blinds are now also used on the salt-marshes, grassed over to resemble a haystack, with shallow ponds dug out of the marsh sod, surrounding them. Before night-shooting was prohibited by Federal law in 1913 most of the ducks on the salt-meadows were shot by "dusking"; that is, lying in wait on points of marsh, or at the mouths of creeks as the ducks flew in from the ocean. This was particularly effective in the dead of winter, when much of the feeding ground was covered with ice and snow, but it was desperately cold work. Hogsheads sunk in the marsh were sometimes used, and bunches of seaweed heaped up on the mud or in shallow drains served as decoys. On moonlight nights the shooter often stayed out until eight or nine o'clock, but large bags were seldom obtained. Giraud (1844) in his Birds of Long Island speaks of two men shooting ninety-nine in a single night at South Oyster Bay many years ago. Ten or fifteen was considered a large bag on Cape Cod in recent years.

In Essex County, Massachusetts, a peculiar coffin-shaped float was used, trimmed with grass in the autumn, but painted white in winter. In Forest and Stream many years ago I described a night hunt in one of these boats. This method required great

skill and an intimate knowledge of tides and winds, and was mostly used by professionals. During northeast storms, many were taken from these floats on the marsh in the daytime. Floats are also used in other regions. In Merrymeeting Bay, in Maine, the shooter anchors a fleet of decoys both live and wooden, and then hides in his float in a nearby rice-bed. When a flock alights among his decoy ducks, he sculls down wind upon them and shoots them as best he can.

Audubon mentions the gunners near Boston using live decoys and shooting from hidden boats in his day. On Nantucket we are told that shooters used to put out a live decoy gull with their live ducks, to make the wild ducks "tamer." On the coast of Virginia many used to be taken with nets at night, but this practice has now been stopped. All along the southern coast the species is much tamer, and comes more readily to wooden decoys.

Baiting is practised now in a great many places, particularly on Martha's Vineyard, on Long Island and on the big club properties of North and South Carolina. This is of course a very effective method of attracting ducks, but it makes the shooting rather too easy at times.

Here and there it is possible to shoot Black Ducks from batteries, — coffin-shaped boxes, sunk with weights to the level of the water, — but as a rule Black Ducks fly high enough to see the battery before they come to it.

Of course there are other ways of getting a few Black Ducks. I have shot many by crawling to them in small ponds or walking them up in a marsh. The latter method is not usually successful unless there is a heavy wind blowing to keep them from hearing you, and you lose many unless you have a good dog. There is really no more sportsmanlike method than stalking, and one has to use every precaution to get within shot of Black Ducks, especially if crawling through woods or brush. A windy day gives one the best chance.

The "Red-legs" that winter in New England seem to have learned all about live decoys, and approach them either not at all, or with the utmost caution and reserve. I have lost many shots at these "winter" ducks by having an energetic call-duck let out a high-pitched *quack* at the wrong moment.

It appears that in early Colonial days some pipe decoys after the style of the Dutch and English ones must have been attempted here in Massachusetts, for I ran across an old reference to a permission granted a resident of Salem in 1638. As I never before heard of "duck-coys" in New England, this paragraph from a book on Salem witchcraft (by Charles W. Upham, Boston, 1867, p. 41) is worth quoting. It says, "At a general court held at Boston, September 6, 1638, it was voted that 'whereas Emanuel Downing Esq hath brought over, at his great charges, all things fitting for taking wild fowl by way of duck-coy, this court, being desirous to encourage him and others in such designs as tend to the public good, . . .' orders that liberty shall be given him to set up his duck-coy within the limits of Salem; and all

persons are forbidden to molest him in his experiments by 'shooting any gun within half a mile of the ponds' where by the regulations of the town he shall be allowed to place the decoys." The Court afterward granted to other towns liberty to set up duck-coys but it is doubtful whether these prospered for long as they savored too much of special privilege.

Behavior in Captivity. In spite of a general impression to the contrary, Black Ducks are not at all easy to rear in confinement. They are as different as possible from Mallards in this respect. One hears frequently of well-established strains of Black Ducks, all but domesticated. When investigated these are often found to be Black Ducks with Mallard blood, or various sorts of "puddle" ducks of the Black "East India" type. When I was in Holland I asked Mr. F. E. Blaauw what luck he had had with our Black Ducks and he told me that he had reared them, but considered them a difficult bird to breed, which bore out my own experience.

Ducklings reared from crosses with Mallards are shy, and more difficult to rear than pure wild Mallards, and the three-fourths Black Duck is still shyer. Black Ducks kept in my ponds have never laid eggs.

The species was first brought to Europe in 1850 (London Zoological Gardens) and bred there until 1867. The maximum age in captivity seems to be about twelve years (P. C. Mitchell, 1911). They are bred at times in this country, but rarely in small enclosures. They can usually be purchased for about $5.00 or $6.00 a pair, but they are not exhibited in large numbers, because they lack the ornamental coloring of most ducks.

Hybrids. Wild-killed hybrids with the Mallard are so numerous as hardly to require special mention. It seems to me that most of these are the result of mixtures between wild male Black Ducks and domestic or semi-domestic Mallards. These specimens are of course mostly males because the females are rarely noticed, differing as they do so very little from either the Mallard or the Black Duck female. I saw a female specimen recently in the collection of Mr. Charles R. Lamb of Cambridge.

In captivity the Black Duck has been crossed with the African Yellow-bill (*Anas undulata*), the Pintail (*Dafila acuta*) and the Common Pochard (*Nyroca ferina*) (Poll, 1911).

GEOGRAPHICAL RACES

RED-LEGGED BLACK DUCK

ANAS RUBRIPES RUBRIPES BREWSTER

Anas obscura rubripes Brewster, Auk, vol. 19, p. 183, 1902; Swenk, Auk, vol. 22, p. 319, 1905; Townsend, Mem. Nuttall Ornith. Club, no. 3, p. 126, 1905; Townsend, Auk, vol. 29, p. 176, 1912; Auk, vol. 33, p. 9, 1916; Oberholser, Auk, vol. 34, p. 192, 1917; Auk, vol. 35, pp. 203, 350, 1918; Phillips, Auk, vol. 37, p. 289, 1920.

Anas rubripes Dwight, Auk, vol. 26, p. 422, 1909; Phillips, Auk, vol. 28, p. 191, 1911.

SUBSPECIFIC CHARACTERS: Size larger or at least having heavier appearance, with the head grayer. Plumage denser. Feathers of pileum usually more edged with grayish or tawny color; throat more spotted or streaked with blackish or very dark brown, the dark markings on the sides of the head larger, more sharply defined and blacker; bill bright yellow, tarsi and toes bright red or coral red, the colors of soft parts brighter in the male.

RANGE: Breeds from south end of Lake Winnipeg and James Bay, to perhaps as far north as Fort Churchill (?); south to southern James Bay and Lake Superior, and eastward for an undetermined distance. In winter south to Arkansas, southern Texas, Louisiana and Alabama, and southeastward through the Great Lakes and New England to the whole Atlantic coast as far as northern Florida.

Note: The long controversy as to the validity of this race now seems to be over, but much more material is necessary to establish the eastern breeding limits of this form. It must also be borne in mind that intermediates are very numerous, possibly more numerous than typical examples of both races. It is very probable that extremes are found breeding west of James and Hudson Bay only. A specimen from Ungava Bay which I examined is not a typical "Red-leg." The description is difficult, but the general appearance of a typical bird of this race, freshly killed, is unmistakable. Females and young are not so easy to distinguish. The question of distinguishing these two races is much complicated by the differential sex migrations, the old males coming south later in both forms, thus giving the impression that all old males belong to the Red-legged race. Out of 224 shot at Martha's Vineyard from September to December, 1919, not one single typical *rubripes* was found, for these were from a group of local ducks of the *tristis* race held over from migrating by consistent baiting. The location was away from salt-marshes and out of the winter range of *Anas rubripes rubripes* (Phillips, 1920a).

This "Red-legged" race outnumbers the eastern one, and appears to be on the increase, extending its range westward. It migrates later, is shyer, hardier, more localized about salt-marshes in winter, and more nocturnal.

GREEN-LEGGED BLACK DUCK

ANAS RUBRIPES TRISTIS BREWSTER

Anas obscura of authors.

Anas rubripes tristis Brewster, Auk, vol. 26, p. 176, 1909; Oberholser, Auk, vol. 34, p. 194, 1917.

SUBSPECIFIC CHARACTERS: Size slightly smaller. Plumage not so thick and long; feathers of pileum not conspicuously edged with lighter shades; chin and throat with very few dark markings, or none at all; dark markings on face and neck smaller, narrower and not so black. Bill olive to greenish black, sometimes more or less of an orange tinge, but never bright, clear yellow; legs and toes dusky

brown to yellowish or pale orange. Colors of soft parts much brighter in the male. The female always has a dark irregular band on the bill about the nostrils in both forms.

GEOGRAPHIC DISTRIBUTION: Breeding from Hyde and Dare Counties, North Carolina, sparingly along coast of Virginia and Maryland up the whole eastern coast, as far as eastern Labrador. Western and northern breeding limit not determined, but probably to Lake Erie. Winters from Nova Scotia south along entire Atlantic coast to northern Florida and the Gulf Coast, but in this latter region not so common as *Anas rubripes rubripes*. It is possible that typical examples are confined to a breeding area extending along the coast and inland for only 150 to 200 miles.

Note: This race probably intergrades with the "Red-legged" form all over the central part of the range of the Black Duck, and also in Ungava. Typically, it is a race of the Atlantic coast. Its migration is early, but some remain along the New England coast all winter, where they are outnumbered by individuals of the "Red-legged" race, and by others not easily classified.

INDIAN SPOT-BILL

ANAS PŒCILORHYNCHA FORSTER

(Plate 24)

SYNONYMY

Anas pœcilorhyncha Forster in Pennant's Indian Zoology, p. 23, pl. 13, fig. 1, 1781.

Anas pœkilorhyncha Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 2, p. 535, 1788.

Mareca pœcilorhyncha Stephens, General Zool., vol. 12, pt. 2, p. 134, 1824.

VERNACULAR NAMES

English: Spot-billed Duck, Spotted-billed Duck, Gray Duck, Indian Spot-bill.

French: Canard à bec tacheté, Canard à bec de lait.

German: Fleckschnabel Ente, Buntschnabel Ente.

Hindu: Garam-pai, Bata, Gugral.

Sind: Hunjar.

Nepal: Naddun.

Manipur: Kara.

Burmese: Vume-be, Tau-bay.

DESCRIPTION

ADULT MALE: Top of the head and a broad orbital stripe dark brown. A narrow superciliary stripe, sides of the head, chin, throat, and neck, cream-color to pale buff, minutely streaked on the cheeks with blackish. Mantle grayish brown, each feather margined with lighter tints. Scapulars dark brown. Back, rump and upper tail-coverts black, becoming iridescent near the tail. Breast and upper abdomen white, boldly marked with round dark-brown spots. Lower abdomen merging into dark brown and black, with the under tail-coverts brown-black. Wing with a typical speculum, iridescent green in color and bounded both in front and behind with a black, and next to it a white bar. Upper wing-coverts dark gray. Tertials, at least two of them, white on the outer web; primaries brown; under wing-coverts and axillars white. Central tail-feathers pointed and black, outer ones brown with light edges.

Iris reddish brown. Bill black with a bright yellow tip; nail black. An area at base of culmen red. Legs and feet deep orange-color.

Wing 248–269 mm.; bill 52–55; tarsus 46–48.

FEMALE: Similar to the male but a little smaller. Color of soft parts, same or nearly so.

IMMATURE: Lack the red patch at base of upper mandible and are much less spotted on the under parts.

INDIAN SPOT BILL
AUSTRALIAN DUCK

EASTERN SPOT BILLED DUCK
PHILIPPINE MALLARD

YOUNG IN DOWN: From the few specimens which I have examined it appears impossible to tell these from the young of the Mallard.

DISTRIBUTION

THE Spot-billed Duck, a species only locally migratory, is confined to the Indian Peninsula, and to some parts of Indo-China. It is known from almost all sections of India south of the Himalayas and appears to be more abundant in the north and west than in the south or east. In the west it is common and breeds in Sind and Guzerat (Hume and Marshall, 1879). It is fairly common in northern Guzerat and probably breeds there (E. A. Butler, 1876). According to Hume and Marshall (1879) it is common on the Indus, the Jhelum and the Chenab Rivers, but it is not known to have ever occurred in Baluchistan or Afghanistan. It is found in the Punjab, excepting in the extreme northwestern sections, but has never been found in Kashmir, Kumaon, or any but the southernmost parts of Nepal (Hume and Marshall, 1879; Whistler, 1922). Southward through central India, however, it is everywhere well known. It is resident in Lucknow (Jesse, 1903), in the Northwest Provinces and Oudh as well as in eastern Rajputana (Hume and Marshall, 1879), but though common in central India it grows rarer toward the south (Baker, 1908). Legge (1880), however, states that it is abundant in the Deccan and probably breeds there. It has never been recorded from southern Konkan (Hume and Marshall, 1879; Baker, 1908) and though it breeds in Mysore, Hume and Marshall (1879) think it must be rare along the entire southwest coast. In Ceylon it is not a very common bird, occurring chiefly on the north and east coasts (Legge, 1880; Baker, 1908; Wait, 1917), and there is some reason to suppose that it is only a winter resident on the island.

In the east the present species is said to be rare in Chota Nagpur (Legge, 1880), and, though it is common in Bengal, where it breeds (Baker, 1908, etc.), it appears to be quite exceptional on the lower Ganges and in the Calcutta region (Hume and Marshall, 1879; Baker, 1908). It is, however, abundant in Sylhet, Cachar and in Manipur, where it breeds; and has been met with at altitudes up to 3000 or even 4000 feet (Baker, 1908). Farther north it is not so common on the Brahmaputra, though it is known from western Assam. Southward it is found in eastern Bengal, Chittagong and possibly in northern Arakan (Hume and Marshall, 1879; Baker, 1908). Specimens found east of Manipur, and in general east of 94° east longitude, have been ascribed to the subspecies *Anas pœcilorhyncha haringtoni*. According to E. W. Oates (1907) this subspecies is confined to the valley of the Irrawaddy and the Shan States, but Baker (1914) goes much further and, regarding the subspecies as a link between *Anas pœcilorhyncha* and *Anas zonorhyncha* of China, apparently includes some records of the Chinese species as properly referring to *Anas pœcilorhyncha haringtoni*. He gives the range of the new subspecies as the whole of Burma, including the Shan States and Chin Hills, Yunnan, Cochin (!) China, and possibly southwestern China, adjoining Burma. Much of this is not wholly clear and the evidence necessary for proof is not given. Baker (1914) furthermore states that the subspecies is found in Assam to the extreme east, rather rarely in Sibsagar and more commonly in Teypur and Lakimpur. Furthermore the older records for the Burmese countries must now be applied to Harington's Duck. Blyth (1875) had recorded it for Assam and the Irrawaddy south to Mandalay. Hume and Marshall (1879) state that the species is not rare in Upper Burma, and E. W. Oates (1883) makes the same remark. Specimens have been recorded from Bhamo (Salvadori, 1887) and J. Anderson (1878) found it not uncommon in Upper Burma, at Bhamo and at Tamilone on the Taipeng River. It has been recorded from the Shan States (Blyth, 1875; E. W. Oates, 1883) and was found common in the South Shan States (Bingham and Thompson, 1900) at Fort Stedman and east to Mongnai (Rippon, 1901). The Gray Ducks seen by Barton (1914) and by Gyldenstolpe (1916) on the Meping River (northwestern Siam) and recorded as *Anas pœcilorhyncha*, no doubt also belong to this subspecies.

The southern limit seems to be about 20° north latitude in Burma and there is no evidence to

support Blyth's (1875) statement that it occurs in Tenasserim. The specimen seen by E. H. Wilson (1913) at Kiating, western China, was probably though not necessarily *Anas zonorhyncha*. The northeastern dividing line between *Anas pœcilorhyncha haringtoni* and *Anas zonorhyncha* is still very uncertain. Finn gives a record of twenty-four specimens of *Anas zonorhyncha* shot in one year at Kengtung, eastern South Shan States and says its breeding there is proved. It is most likely a case of *Anas pœcilorhyncha haringtoni* also, for the true Chinese species breeds in northeastern Asia. Many "hybrids" are recorded from the Shan States and eastern Burma and these too are no doubt to be regarded as specimens of the subspecies.

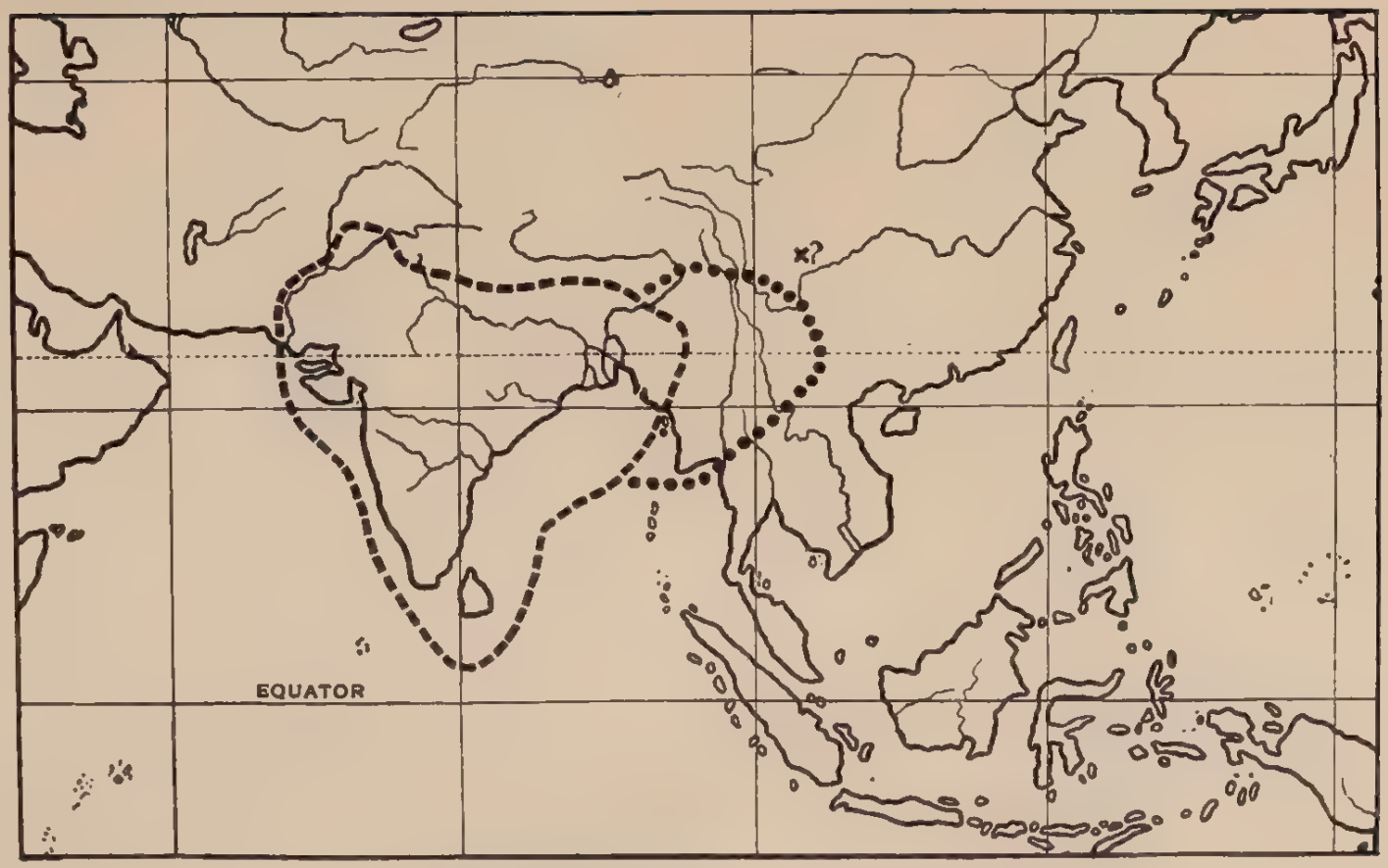
GENERAL HABITS

HAUNTS. This fine Mallard-like species, confined to India and the Malay countries, is strictly non-migratory in the proper sense of the word, although like all tropical ducks it wanders about locally, governed by the distribution of the rains. The exhaustive works of Hume and Marshall (1879) and Baker (1908) contain nearly all that is known of its life-history. They agree in saying that the haunts vary, but that the bird prefers *tanks*, *jheels* (small pieces of water well covered with weeds), and more rarely small quickly flowing streams in the forest. On the other hand these ducks resort much less frequently to large open waters or to the bigger rivers like the Ganges, Jumna and Brahmaputra. Hume and Marshall (1879) say that they are quite common on the Jhelum, Chenab and Indus. This is strictly a fresh-water duck and is almost absent from the Sunderbunds and other brackish or tidal waters. In the interior it is confined to the low-lying regions, but in Manipur and in the Tankul Hills it has been taken at elevations of 3000 feet and in the Darjiling Terai up to 4000 feet (Baker, 1908).

WARINESS. The Spot-bill is not a particularly wary duck, and until it has been much shot at, it can generally be approached near enough for a shot without much trouble. Baker (1908) describes them as sleeping on the margins of smaller ponds, with one or two left on sentry duty near the edge.

DAILY MOVEMENTS. There is nothing characteristic of the daily habits. They feed in the rice-fields and elsewhere by night, and during the day sleep far out on the open water.

GAIT, SWIMMING, DIVING, FLIGHT. On water and on land their carriage is exactly like that of the Mallard, although Hume and Marshall (1879) regard them as swimming and diving "more briskly" than the Mallard. Of course the birds dive only when immature, or when wounded, but when winged they are said to give more trouble than any other duck, since they dive very freely and (according to Hume and Marshall, and Baker) sometimes grasp the weeds under water and drown! More often they dive very cleverly, and show only the bill above water. If



MAP 32. Distribution of Indian Spot-bill (*Anas poecilorhyncha*)
(Dotted line shows distribution of the race *haringtoni*)
Questionable sporadic record indicated by cross (×?)

winged so as to make diving painful and impossible, they make for the nearest cover.

Due no doubt to their shorter wings and their non-migratory habits, they rise less easily than the Mallard. But once on the wing they fly as fast as the common northern ducks. Hume and Marshall (1879) compare their rather heavy "get-away" to that of an old hen. During the rains, just before the nesting season, they travel about in pairs, and even in the cold season, when they gather on larger sheets of water, they are found scattered about in small family parties. Hume and Marshall (1879) say they have never seen parties of more than a dozen, but quote Reid as having seen as many as thirty in a flock, and McInroy who claims to have "frequently seen at least a hundred of these ducks sitting together on the shores of various *tanks* in the Mysore Province"; the latter adds that they kept together when on the wing.

Association with other Species. Hume and Marshall (1879) found the Spot-bill an unsociable bird, mingling rarely with other species. At most it may be found in company with Teal or Shoveller. Woods (in Baker, 1908) think she has often seen solitary Spot-bills piloting a flock of Teal across a *jheel*.

Voice. In the only pair which I myself kept I never remarked anything peculiar about the note. Most writers agree in saying that the voice is exactly like that of the Mallard. Hume and Marshall (1879) alone consider the notes somewhat more sharp, not so sonorous, but apparently emitted with greater force than in the Mallard. Of course slight differences in voice between two different species of Mallard-like ducks are extremely difficult to estimate, because Mallards themselves show a great range of individual variation in this respect. This variation I think is dependent somewhat on age, for the younger birds sound a bit shriller.

Food. The Spot-bills are omnivorous feeders, most likely preferring animal food when they can obtain it readily, but also taking much vegetable matter and doing much damage to the rice, both when it is young and when in the ear. Baker (1908) thinks they are principally vegetable feeders, but Hume and Marshall (1879) mention as animal food, worms, small frogs, and insects and their larvæ. Three stomachs examined by Mason and Lefroy (1912) all contained some animal food, chiefly water-snails (*Vivipara crassa*) and in one case a small frog.

Courtship and Nesting. As with most tropical ducks, the breeding season is very variable, extending, in India, from April to October. In the Northwest it breeds from the middle of July to the middle of September. In Sind it is said to lay in April and May and again in September and October, but it is more than doubtful whether

the same birds ever lay twice in one year. In Mysore, November and December are the months given by Hume and Marshall (1879). Baker (1908) gives the months of July and August as the principal breeding period in Bengal, though some nest earlier. In Mymensingh and Sylhet he has seen adults with young in April, while eggs have been taken in August. Old birds have been found in Manipur paired in April but nests have been found as late as October. In one place in Manipur eighteen miles from Imphal, flappers were found in every stage of development toward the end of the rains.

Nothing is known of the courtship, except for a note by Heinroth (1911) who says their display closely resembles that of the Mallard. It would be extremely interesting if an accurate comparison of the display in the two species could be made.

The nest is of the usual duck type: a compact structure of grasses, rushes and weeds, and almost always lined with down. It is almost invariably placed on the ground near the water. Hume, however, found a nest in a tree on a horizontal "trifurcation" of a bough, and nine inches above the water. Ridges between rice-fields seem to be favorite nesting places (Baker, 1908).

The normal clutch is about the same as that of the Mallard, that is eight to ten and often fewer. The maximum recorded seems to be fourteen (Woods in Baker, 1908). The eggs are of a short elliptical form, devoid of gloss, or only slightly glossy, and white or grayish white in color. They measure 52.5–58.5 by 42–45.5 mm. (E. W. Oates, 1902), and are about the same length as those of the Mallard, but slightly wider. The incubation period, according to Heinroth (1908), is about twenty-nine days, but it is probably no longer than the Mallard's, and Mr. Wormald's home-bred strain hatch in twenty-six to twenty-eight days. Although the behavior of the parent birds during the incubation period has never been described in detail, it seems safe to presume that the male stays with the female at least until after the young are hatched, as is the case with most ducks in which the sex plumages are similar. Butler (in Hume and Marshall, 1879) says the nests are easy to discover, as the old birds are generally in pairs close by, either swimming in the water or sitting on the bank. Sometimes the birds wheel round and round in the air just above the nest, says Baker (1908), and refuse to leave even after the nest has been rifled.

STATUS. No specific information is available as to whether this bird is holding its own.

ENEMIES. There is no information on this point, excepting a solitary note by Doig (in Hume and Marshall, 1879) who speaks of finding a nest destroyed and the eggs broken, the culprits evidently being a family of otters.

DAMAGE. They feed largely on rice and do considerable damage to the crop, both when it is young and when ripe (Baker, 1908).

FOOD VALUE. Hume and Marshall (1879) class it as second only to the Mallard and Pintail as a bird for the table, while Butler and Baker (1908) seem to consider it a close rival of the Mallard. It is said to be larger and more uniformly in good condition than that species, but at times it is thought to have a fishy flavor.

HUNT. The Spot-bill is regarded as one of the best of the Indian sporting ducks. The hunters lie in wait for it on moonlit nights and sometimes use decoys. Numbers of the flappers are caught by the Mussulman Manipuris with spears and nets, and they sometimes form part of the bag when the natives of other parts of India have a duck-drive into nets (Baker, 1908). Hume and Marshall (1879) say the shikaris wade up to them with guns concealed behind bundles of floating rushes. Occasionally Spot-bills are caught by hand by the well-known method of wading in with only the disguised head of the hunter above the surface.

BEHAVIOR IN CAPTIVITY. This species was represented in the famous collection of the Earl of Derby at Knowsley, and was acquired by the London Zoological Society from that collection in 1851. It was not again imported until 1868, when several males were received. It first bred in London in 1874, and several times in the subsequent years. It was common in zoölogical gardens on the Continent by 1880. In the Calcutta Gardens it bred in 1885 and has been bred often by private aviculturalists.

The only pair I ever kept did not breed, but proved hardy, became very tame, and lived a number of years on my ponds until I finally sold them.

Miss Hubbard found that Spot-bills could support considerable cold. Her birds laid in April and one nest contained twelve eggs, six of which produced young.

Rogeron (1903) has nothing good to say about them from an avicultural viewpoint, and found that they triumphed over other species and were always crossing with Mallards, African Yellow-bills and Australian Ducks. Besides they were as greedy as Domestic Ducks with much more vigor and agility in their movements, a "sort of savage agility which completely lacks charm and grace." Hybrids with the Mallard inherited, so he thought, all the "faults of character" of the Spot-bill parent.

Captivity-bred strains are easy to rear and one female in Mr. Wormald's (1922) ponds laid three different clutches of eggs in the summer of 1922. It is doubtful whether they ever breed until two years old, but more information is necessary.

In England they sold at from £2 to £6 per pair before the War, and at the present time good hand-reared birds bring about £5 the pair. They are not very commonly imported into America, and bring only moderate prices, the New York Zoölogical

Society having obtained them at an average of $12.00 per pair, although this is certainly low. They were first bred in this country by Frederick Gallatin.

They live well in confinement and the average duration of life of thirty-seven individuals in London was thirty-three months with a maximum age of ten years and seven months.

GEOGRAPHICAL RACES

ANAS PŒCILORHYNCHA PŒCILORHYNCHA Forster

Characters: Orange spot at base of culmen; bill large.

Range: India as far as western Assam, and in Cachar, Sylhet, Chittagong, and possibly into Arakan. The specimens which I have seen from Manipur and Assam (British Museum) appear the same as those from India.

ANAS PŒCILORHYNCHA HARINGTONI (Oates)

Polionetta haringtoni Oates, Journ. Bombay Nat. Hist. Soc., vol. 17, p. 558, 1907.
Anas haringtoni Harington, Journ. Bombay Nat. Hist. Soc., vol. 19, p. 313, 1909.
Anas pœcilorhyncha haringtoni Baker, Journ. Bombay Nat. Hist Soc., vol. 22, p. 805, 1914.

Characters: Orange spot at base of bill absent. Size slightly smaller. Specimens from southern Shan States in British Museum seem to be a little lighter colored on the breast and upper abdomen.

Range: Valley of the Irrawaddy River and the whole of Burma, the Shan States and Chin Hills, Yunnan, Cochin-China and possibly southwestern China (Baker, 1914).

EASTERN SPOT-BILLED DUCK or GRAY DUCK

ANAS ZONORHYNCHA SWINHOE

(Plate 24)

SYNONYMY

Anas pœcilorhyncha Reichenbach (*nec* Forster), Synopsis Avium, Natatores, pl. 111, fig. 1081, 1845.

Anas zonorhyncha R. Swinhoe, Ibis, ser. 2, vol. 2, p. 394, 1866.

VERNACULAR NAMES

English: Eastern Spot-billed Duck, Eastern Yellow-billed Duck, Zone-billed Duck, Dusky Mallard, Eastern Gray Duck, Yellow-nib.

French: Canard à bec orange.

German: Gelbschnabel Ente.

Japanese: Karugamo.

DESCRIPTION

ADULT MALE: Most like the male of *Anas pœcilorhyncha*, but the whole under surface except breast a nearly uniform gray brown with spots hardly showing at all. Some specimens are much darker than others. The upper breast is lighter and more like that of *Anas pœcilorhyncha*, but is less heavily spotted. The head is nearly the same except for the presence of an ill-defined stripe running back from the angle of the jaw. Upper surface nearly the same, but mantle more uniform. Speculum purple instead of green. Anterior white wing-bar reduced or nearly absent. Posterior white bar absent or reduced to a mere line.

Iris yellow-brown. Bill without the orange patch at base of culmen; tip yellow. Legs and feet deep orange.

Wing 263–293 mm.; bill 50–55; tarsus 43–49.

ADULT FEMALE: Under parts much more streaked and spotted than in the male. Upper side nearly the same as in male; colors of soft parts the same; size smaller.

Wing 255–262 mm.; bill 45–49; tarsus 42–44.

IMMATURE SPECIMENS: Paler than the female, and with small dusky spots on the under parts. The edges of the upper wing-coverts pale; a broad subapical white band across the greater wing-coverts, and the outer web of the tertials for the greater part white (Salvadori, 1895).

YOUNG IN DOWN: Upper side from the forehead to the tail pale olive-brown; a stripe of the same color from the base of the culmen through the eye, and another short line under the ear-coverts; superciliary stripe, sides of head and neck, throat, crop, and the back edge of the wing, a spot behind the wing, and another on the sides of the rump light pale-yellow. Sides and front part of breast, almost to the middle, grayish brown; middle of the under side of the body, dirty, rusty cream-color (Hartert, 1920).

DISTRIBUTION

The present species appears to be essentially non-migratory, although if data were to be had it might be shown that there are more or less, perhaps even considerable, seasonal movements in the northern part of the range. The species is distinctly a Chino-Japanese one and is rarely found outside the dominions of these two countries. In the east this duck extends north as far as the Kuriles, though probably only to the southernmost islands of the group (Ogawa, 1908; Stejneger, 1898) and on Yezo (Ogawa, 1908) where it is resident and common (Seebohm, 1890). Whitely (1867), however, found it a rare bird at Hakodadi. On the island of Saghalin, eggs were taken at the mouth of the Susuya River on May 17, 1906 (Lönnberg, 1908), but this is the only record of its occurrence even in the south of this island. In Japan proper the species is resident (Seebohm, 1890) and breeds on the inland lakes, as at Chiusenji Lake (Jouy, 1883). Kuroda (1918) has also recorded it breeding, and Blakiston and Pryer (1878) found it nesting abundantly in Tokio Bay. Ogawa (1908) has recorded it for Yokohama. Southward, these ducks have been met with on various islands of the Loo-choo group, namely on Tanegashima, Okinawashima and Ishigakishima (Ogawa, 1905) and they are known also from Formosa (R. Swinhoe, 1863; Uchida, 1912) where, however, they seem to occur only in winter (R. Swinhoe, 1863). The southernmost record is probably that of R. C. McGregor (1909) who met with no less than twelve birds on Calayan Island, northern Philippines, on December 7, 1903. This date and R. Swinhoe's (1863) remark about Formosa, as well as notes about certain localities in southern China, lead me to suspect that the species is primarily, though not exclusively, a winter bird in southern China, south of perhaps 30° north latitude.

Kuriles

Saghalin

Japan

Formosa

Philippines

In eastern Asia the present species does not occur much north of the Amur. Von Homeyer (1870) has recorded a specimen from the middle Amur and Dybowski (Taczanowski, 1873) found it in Dauria on the Onon and Argun Rivers. Radde (1863) met with it in the same region at Udir. It no doubt breeds, for Dybowski (Taczanowski, 1873) found the birds in pairs in May and took young in down (*fide* Taczanowski, 1893). Farther south the species breeds in Manchuria (Kuroda, 1918) but it is rare about Lake Hanka (Prjevalski, 1878). Taczanowski (1893) has recorded its occurrence in Korea, and Kuroda (1918) states that it breeds in that peninsula. Farther west the Eastern Yellow-bill is quite common in southeastern Mongolia and breeds in the valley of the Hoang-ho (David and Oustalet, 1877; Prjevalski, 1878). On the coast it is everywhere abundant; it is resident at Peking (David and Oustalet, 1877), at Wei-hai-wei (K. H. Jones, 1911), at Kiau-chau (Kleinschmidt, 1913) and throughout the valley of the lower Yangtse, from Kiu-kiang (La Touche, 1892; Seebohm, 1884) and even Hankow, to the sea (Styan, 1891; R. Swinhoe, 1866). According to La Touche (1892) it is resident even as far south as Foochow and Swatow, and R. Swinhoe (1870) has recorded it from Canton. Vaughan and Jones (1913) state that it is the commonest duck in winter in southeastern China, about Hong-kong, and that a few stay throughout the summer to breed.

Manchuria

China

The western limits of this duck are still largely undefined. Since the erection of the subspecies *Anas pœcilorhyncha haringtoni* (Oates) I think all the numerous records of *Anas zonorhyncha* occurring in Burmese countries must be referred to the subspecies that forms the link between the Indian and the Chinese forms. The two species, or intergrades between them, are probably found near together in Yunnan and possibly in extreme eastern Assam, if the records for Dibrugarh really refer to *Anas zonorhyncha*. Farther north the Chinese species certainly goes west to 100° east longitude for Thayer and Bangs (1912) have recorded no less than eleven specimens taken in winter (December) in western Szechwan where W. R. Zappey found the species common. I think the bird doubtfully recorded as *Anas pœcilorhyncha* by E. H. Wilson (1913) from Kiating (Szechwan) was probably also of this species. It is recorded as common in winter at Shasi, Hupeh (La Touche, 1922). Still farther

MAP 33. Distribution of Eastern Spot-billed Duck (*Anas zonorhyncha*)

north this duck was not seen by Prjevalski (1878) in Kan-su, on the Koko-nor or on the Zaidam, but since then Berezowski and Bianchi (1891) have reported it in Kan-su, central China, and even in the Nan-shan Mountains, and David and Oustalet (1877) speak of it as breeding in the Ordos and in Mongolia. The western limit is evidently about 100° east longitude. There are two extreme western records: one of a bird collected by Holderer in central Asia, — no locality (Schalow, 1901), — and one for the vicinity of Angssi, Tien-shan region, collected by the Grum-Grzimailas, February, 1890 (Pleske, 1892).

GENERAL HABITS

Almost nothing about the life-history of this bird is to be found in the literature of ornithology. All one can do is to presume that its habits are very similar to those of the Indian Spot-bill or the Mallard. Although primarily local there is little doubt that it is migratory in the northern and northwestern parts of its habitat. Prjevalski found it migratory in southeastern Mongolia.

Unlike the Spot-bill it seems to be very partial to salt water. Vaughan and Jones (1913) found it in Canton Bay on islands and boulders off the coast, flying inland to the paddy-fields at sunset. In summer the birds are found in pairs or threes, but in October and November they assemble in large flocks. In Lakhimpur (Assam) a flock of forty (species?) was seen on one occasion, but as a rule the birds are found there singly or in pairs, or less frequently in parties of four or five (Baker, 1908). Baker always found single individuals in the company of Teal, Gadwall or other ducks, and remarks that they were extremely wild in this region. On the coasts about Hong-kong (according to Vaughan and Jones, 1913) they were found in the autumn associating with gulls (*Larus canus* and *Larus cachinnans*), cormorants (*Phalacrocorax*) and egrets (*Demiegretta*).

Nesting. In the Hong-kong region the Eastern Gray Duck seems to nest in April, for Vaughan and Jones (1913) found ducklings swimming in the sea in May. On rocky islands outside Swatow, La Touche (1907) noted them breeding in May and June and found some eggs on the point of hatching as late as July. Styan (1891) found eggs on the lower Yangtse in May and also in July. Those of the latter month he attributed to a second brood. At the northern limit of its range in Dauria birds were found paired early in May, and Dybowski took downy young in that region (Taczanowski, 1870). Blakiston and Pryer (1882) say it nested in a park near Tokio in April, while in southern Saghalin eggs have been taken as early as May 17 (Lönnberg, 1908).

A nest found near Swatow on the summit of an island was located among low brushwood and rank grasses (La Touche, 1907).

Food Value. Like the Indian Spot-bill these fine large ducks are excellent for the table. The Chinese are said to split them down the back, dry them and sell them

in the markets of Canton (Vaughan and Jones, 1913). Many are said to be caught in flight-nets in that region. The late Walter R. Zappey who collected for Thayer and Bangs in western Szechwan in 1908, said that the natives shot these birds in considerable numbers for food. Baker (1908) speaks of shooting these and other ducks in Lakhimpur, by erecting concealed platforms and then making drives with boats.

STATUS. There is no information as to recent increase or decrease of this species, but in 1913 it was said to be the commonest duck in southern China (Vaughan and Jones, 1913). Ghidini (1911), speaking of wholesale importations of ducks from the lower Yangtse to Europe, says he found among a large number of other species a few specimens of the Eastern Gray Duck. Apparently these birds were shipped from the vicinity of Hankow.

In Japan this duck is protected by law from April 16 to October 14 and is then regarded as a game-bird.

I have never seen this bird in confinement in America, and so far as I know it has never been imported alive into either America or Europe.

PHILIPPINE MALLARD

ANAS LUZONICA FRASER

(Plate 24)

SYNONYMY

Anas luzonica Fraser, Proc. Zool. Soc. London, 1839, p. 113.
Anas luconica Finsch, Journ. f. Ornith., vol. 18, p. 358, 1870.

VERNACULAR NAMES

English: Philippine Mallard.
Filipino: (*Manila*) Dumaras; (*Ticao*) Damulog.

DESCRIPTION

ADULT MALE: In general appearance similar to *Anas superciliosa*, but the plumage is more gray and very uniform, both above and below. Top of head dark brown, extending back into the gray of hind neck. A superciliary stripe, the sides of the head, chin, throat and under side of neck a ruddy buff, or rufous color. Through the eye and extending from the bill to the occiput is a wide blackish band. Back and rump much darker than rest of plumage. Wing with a purplish green speculum bordered in front and behind by black bands and also by narrow anterior and posterior white bars.

Iris hazel. Bill lead-blue. Legs and feet blackish brown (J. Whitehead, 1899).

Wing 240–250 mm.; bill 54; tarsus 46.

ADULT FEMALE: Similar, but slightly smaller. Wing 235 mm.; bill 51; tarsus 46.

IMMATURE: Similar to adult, only much paler on the head and throat, which are scarcely tinged with rufous; the speculum less bright and with some purple reflections (Salvadori, 1895).

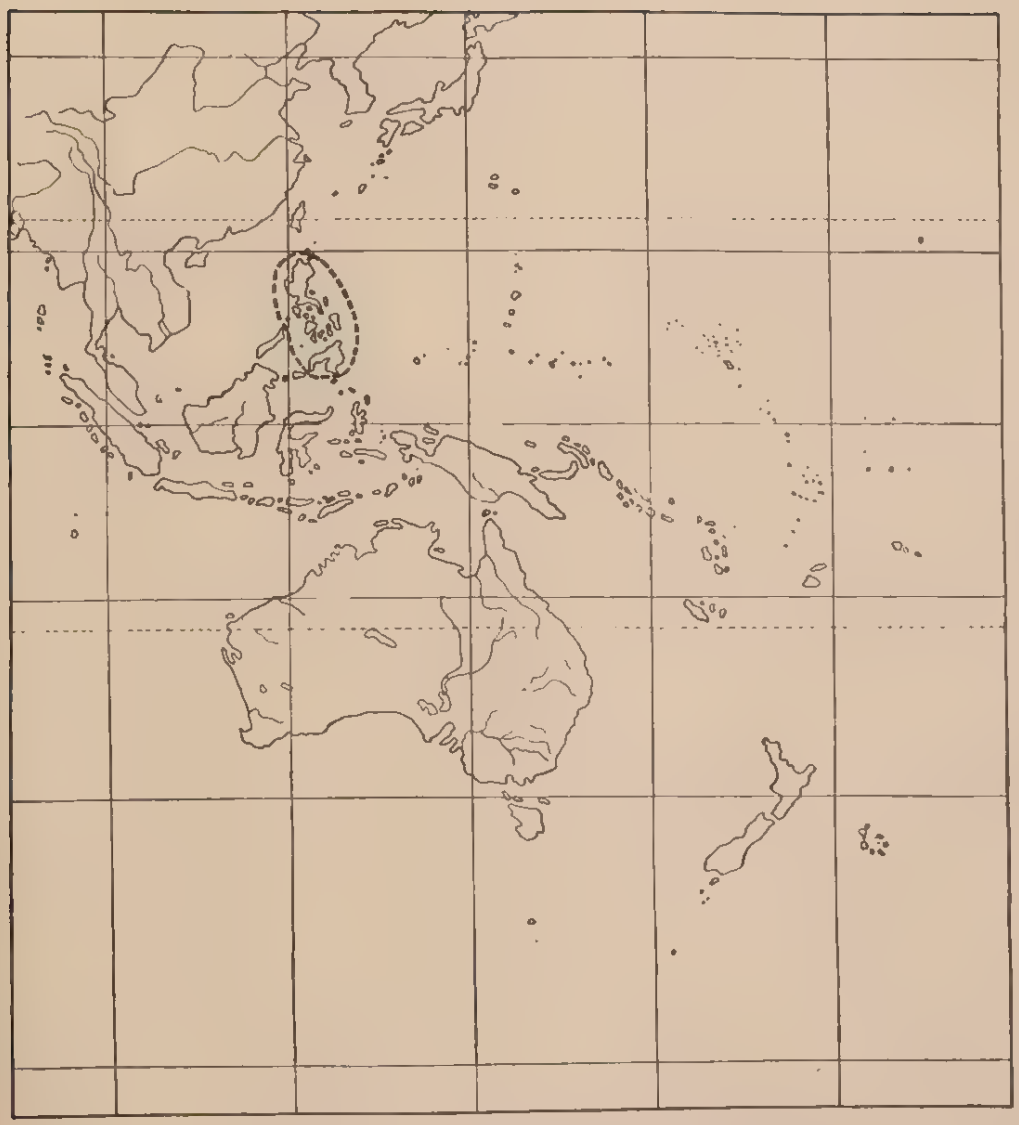
DISTRIBUTION

THE Philippine Mallard has never been met with outside the Philippine archipelago. Recent years have shown it to have a wide distribution in those islands. It is essentially a rare bird and is seldom seen in great numbers. The species was discovered by L. Fraser (1839) on the island of Luzon, and for many years was known only from that island. It has been recorded from there by Cuming (British Museum), Heriot (British Museum), J. Whitehead (1899) and R. C. McGregor (1909), while Worcester (*fide* R. C. McGregor, 1909) found it in great numbers on the lower Abulug River in March. J. Whitehead (1899) found it on Catanduanes, and R. C. McGregor (1909) has recorded it from Lubang. It occurs on Mindoro (R. C. McGregor, 1909) and also on Marinduque (Steere, 1890), Ticao (R. C. McGregor, 1909) and Masbate, where Worcester and Bourns (1898) found it common at Milagros on the west coast. It has also been recorded from Samar (J. Whitehead, 1899), Panay (Worcester and Bourns, 1898), Guimaras and Siquijor (Steere, 1890), and even from Mindanao (Mearns, *fide* R. C. McGregor, 1909). Negros, Cebu, Bohol and Leyte are the only ones of the larger islands from which it has not yet been reported.

GENERAL HABITS

Very little has been written about the life-history of this bird. J. Whitehead (1899) found it in large flocks on the Rio Grande in northern Luzon during the month of April, when over a hundred could be seen together. It frequents small mountain lakes, usually in small flocks, in Benguit and Lepanto. Whitehead found it tame; two of his servants shot over twenty in two hours on one of the Lepanto Lakes. R. C. McGregor (1909) did not often find it in large numbers, but usually in pairs on the tidal creeks, small ponds or other suitable localities. Worcester and Bourns (*fide* R. C. McGregor, 1909) considered it rare in all localities visited, except Milagros on the west coast of the island of Masbate, where it was very abundant, occurring in great flocks. Aggregations of from twenty-five to two hundred were constantly met with on the lower Abulug River in northern Luzon. Governor W. Cameron Forbes told me that he did not consider this at all a common duck and that in all his travels about the islands he never met with it anywhere in really large assemblages.

It has never been exported alive to Europe or America.



MAP 34. Distribution of Philippine Mallard (*Anas luzonica*)

AUSTRALIAN DUCK

ANAS SUPERCILIOSA GMELIN

(Plate 24)

SYNONYMY

Anas superciliosa Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 1, p. 537, 1788.
Anas leucophrys J. R. Forster (*nec* Vieillot), Descriptiones Animalium, p. 93, 1844.
Anas mülleri Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 649, 1856.
Anas superciliaris E. L. and E. L. C. Layard, Ibis, ser. 4, vol. 4, p. 233, 1880.
Additional synonymy under Geographical Races.

VERNACULAR NAMES

English: Black Duck, Australian or Australasian Wild Duck, Brown Duck, Gray Duck.

French: Canard à sourcils blancs.

German: Australische or Australasische Wildente, Augenbrauen Ente.

West Australian: Gwoom-nan-na, Mara or Koona.

New Zealand: He-turvera, Parera, Muamu.

Celebes: Kiti-balang.

Bismarck Archipelago: Mbolom.

Pelew Islands: Atababar, Tabarr.

Society Islands: Mora.

Samoa Islands: Toloa, Doloa.

Tonga Islands: Toloa.

New Caledonia: Nia.

Fiji Islands: Ngaloa.

DESCRIPTION

ADULT MALE: In general appearance it bears a close resemblance to *Anas rubripes*, from which it can be told at once by its very black face-striping and its green speculum. General plumage above dark brown, the feathers edged with buff; lower parts uniform dark brown or gray-brown, the margins of the feathers edged also with buff. Top of head black, or nearly so, merging into gray on the hind neck; below this a narrow buff line. Below this and extending from lores through and behind eye, a broad black or blackish band. The rest of the face, chin and throat light buff, except for minute streaks here and there condensed into a band running back from angle of jaw. Wing-speculum like that of *Anas rubripes* but green instead of purple. Axillars and under wing-coverts white.

Iris hazel-brown. Bill plumbeous, with the nail black. Legs yellow-brown to yellowish, webs dusky.

Wing 247–272 mm.; bill 48–54; tarsus 43–49.

Weight 2 pounds or a little more (0.90 + kilograms).

ADULT FEMALE: Similar to male, but slightly smaller.

IMMATURES IN FIRST PLUMAGE: No specimens available.

YOUNG IN DOWN: In general appearance very similar to, and not always to be distinguished from the Mallard. Crown very dark, eye-stripe darker and more prominent than in Mallard. A small black area at angle of jaw indicates the jaw-stripe in the adult and is not present in the Mallard nor in the American Black Ducks. This last appears to be the best character. Legs and bill darker than in Mallard.

DISTRIBUTION

THE Black Duck inhabits Australia and Polynesia, is a common species, and as far as is now known, is essentially resident in the localities where found. It is rarely found north of the equator, but seems

Sumatra to be not uncommon in the Pelew Islands, whence it has been reported by Tetens (*fide* Finsch, 1875) and Kubary (*fide* Finsch, 1875). Its westernmost limit is Sumatra where it was found in the central part of the mountain range at Alahan Panjang by the Mid-Sumatran Expedition, and where it was discovered to be common about Korinchi Peak and Korinchi Lake

Java (Robinson and Kloss, 1918). It seems to be a well-known bird in Java (Boié, Leyden Museum; Junghuhn, Leyden Museum; Vorderman, 1883; Hartert, 1901–02; Koningsberger, 1915). It has been met with in the Kangean Islands (Mathews, 1914–15) and also in Lombok at altitudes up to 12,000 feet (Everett, *fide* Meyer and Wiglesworth, 1897; Hartert, 1896a), in Flores (Leyden Museum), in Sumba (Riedel, *fide* Salvadori, 1882; Hartert, 1898), not rarely in Savu (Hartert, 1897) and in Timor (Müller, Leyden Museum; Wallace, *fide* Salvadori, 1882). So far it

Celebes has never been found in Borneo, but it is quite common on Lake Posso, central Celebes (Sarasin, *fide* Meyer and Wiglesworth, 1898) and at Paloppo (Koningsberger, 1915), and is also known from Maros in southern Celebes (Platen, *fide* Meyer and Wiglesworth, 1898). It

Moluccas is remarkable that in the Moluccas it is known only from Buru (Forbes, British Museum) where, according to Stresemann (1914a) it is common. Considering its occurrence in the Pelew Islands and in New Guinea, it must inhabit other islands in the Moluccan archipelago. So far as I know it has not been recorded from Timor Laut nor from the Aru group,

New Guinea nor have I found any evidence of its occurrence in Dutch New Guinea though there can be little doubt of its presence there. It has been reported from German New Guinea for Huon Gulf (A. B. Meyer, 1884) and has been found on the Admiralty Islands (Rothschild and

Bismarck Archipelago Hartert, 1914) as well as on New Hanover (Cabanis and Reichenow, 1876) and in the Bismarck Archipelago at Torin (Dahl, 1899). W. Meyer (1909) reports a duck resembling the present species as common in the Bismarck group and it is said to breed at Karavat. There is, however, some reason to suppose the birds are migratory in this region In British New Guinea the species was found on the Laloki River (Goldie, *fide* Ramsay, 1879), at Port Moresby (Stone, *fide* Salvadori, 1882) and at South Cape (Ramsay, 1879). Sharpe (1878) states also that it occurs in southeastern New Guinea. Ramsay (1879a) has recorded its occurrence in the Louisiades, and Hartert (1899) says it has been found on St. Aignan in the same group. It is known also from

Solomon Islands the Solomon Islands (Ogilvie-Grant, 1888; Woodford, 1890, p. 58) where it was found rare on Ugi and St. Christoval (Ramsay, 1882) but common on Ysabel (Rothschild and

New Hebrides Hartert, 1902). Tristram (1894) found it also on Santa Cruz. Layard (*fide* Wiglesworth, 1891) met with the species in the New Hebrides, and Tristram (E. L. and E. L.

Loyalty Ids. C. Layard, 1878) has recorded it for Aneiteum Island in the same group. In the Loy-

New Caledonia alty Islands it has been found in Lifu (Layard, *fide* Wiglesworth, 1891) and in New Caledonia it is a common bird (E. L. and E. L. C. Layard, 1882; Sarasin, 1913).

In Australia the Black Duck is found in all sections and is almost everywhere common. Carter and Mathews (1920) state that it is abundant and breeds in southwestern Australia, but according

Australia to C. G. Gibson (1909) it is rare in Belladonia. Very likely it is rare not only in the desert regions of western Australia but also along most of the south coast south of the great Victoria Desert. It would be useless to record all the very numerous reports of the occurrence

MAP 35. Distribution of Australian Duck (*Anas superciliosa*)

of the present species in Australia. The Emu for the past ten years gives numerous records. I must confine myself to a selection of the older writers. Crossman (1909) states that it is common on the Salt River, West Australia, and in the same State it is abundant at Moor (Orton and Sandland, 1913), rare at Point Cloates and on the Gascoyne (Carter, *fide* North, 1913). **West Australia**

It is a common breeding bird about Derby and the Fitzroy River (Ramsay, 1888; Söderberg, 1919) and common in the northwestern areas (North, 1898). In the North Territory it is found at Ports Darwin and Essington, and on the Gulf of Carpentaria (Ramsay, 1877), as well as on the Mary and South Alligator Rivers (Hartert, 1905). How far south it may extend into the interior I am unable to say. In Queensland, according to Ramsay (1877), it occurs in the Cape York, Rockingham Bay, Port Denison and Wide Bay regions, while Broadbent (1910) states that it breeds in Cardwell in the north, and it has also been recorded breeding at Duaringa, and on the Dawson River in the southern sections (North, 1913). The same writer states that it is very common in New South Wales after the rains and that it breeds in that region. He states furthermore that a few are found about Sydney, on the George River, at Port Hacking, on the Narrabeen Lagoons, at Botany Bay, etc. Ramsay (1877) has recorded the species for the Richmond and Clarence River districts and for the interior. It is common and breeds also in the Mudgee region (Cox and Hamilton, 1889). In Victoria the species appears to be as common as elsewhere on the continent. Ramsay (1877) has recorded it for this State and it has been furthermore reported as occurring about Melbourne (Keartland, *fide* North, 1913), as breeding on the Murray River (R. Hall, 1909) and on Lake Boga, as well as on the Kow Plains, northwestern Victoria (F. E. Howe, 1910). In South Australia it is a very common bird (Ramsay, 1877; White, *fide* Mathews, 1914–15) and breeds on Lakes Alexandrina and Albert (Mellor, *fide* Mathews, 1914–15). It is very common in the Dalhousie region (S. A. White, 1913) and on the Eyre Peninsula (R. Hall, 1909). According to Eylmann (1911) it is everywhere a common breeder in the interior. On the islands of Bass Strait (North, 1913) and in Tasmania also this species is common, and is known to breed (Ramsay, 1877; Holden, *fide* North, 1913; Fletcher, *fide* Mathews, 1914–15). **Queensland** **New South Wales** **Victoria** **Tasmania**

Off the east coast of Australia the Black Duck has been found on Lord Howe Island (Ramsay, 1888) though it appears to occur there only occasionally (Hull, 1909). On Norfolk Island it has also been met with (Ramsay, 1888; von Pelzeln, *fide* Salvadori, 1882) and Hull (1909) states that it breeds there. It is a common resident and breeding bird in both the North and the South Islands of New Zealand and occurs everywhere (Buller, 1888; Finsch, 1870a; W. W. Smith, 1889; Hutton, 1904). South of New Zealand it is not uncommon on the Auckland Islands (Ogilvie-Grant, 1905b) and probably rare on Campbell Island, where it has been found (Gray, *fide* Salvadori, 1882). East of New Zealand it is common on the Chatham Islands (H. O. Forbes, 1893; Hutton, 1904; Buller, 1888; Travers, 1872) and presumably breeds there. On the Kermadecs, north of New Zealand, it is a resident species (Cheeseman, 1891; Iredale, 1913) and has been found breeding in a high crater on Sunday Island in that group (Oliver, 1913). It has been met with also in the Tonga Group on Eua (Hübner, *fide* Salvadori, 1882; Finsch and Hartlaub, 1867) and on Tongatabu (Peale, *fide* Finsch and Hartlaub, 1870a) as well as in the Fiji Islands on Kandavu and Niuafou (Finsch, 1877a, p. 737; 1877b, p. 785), and on Viti Levu (Gräffe, *fide* Finsch and Hartlaub, 1867; Layard, *fide* Wiglesworth, 1891). P. H. Bahr (1912, p. 312) states that it is growing rare on the Fiji Islands, particularly on Viti Levu. Farther east the species has been found on Upolu and Tahiti (Gräffe, *fide* Finsch, 1872b, p. 33) in the Samoa group, and on Huaheine (Peale, *fide* Finsch and Hartlaub, 1867; Wodehouse, *fide* Wiglesworth, 1891) in the Society group. It has recently been taken in the Austral Islands on Rimitara, Tubuai and Ravavai (R. H. Beck specimens, Whitney South Sea Exped). The extreme easterly recorded occurrence appears to be Rupa Island, some distance **Lord Howe Id.** **Norfolk Id.** **New Zealand** **Chatham Ids.** **Tonga Ids.** **Fiji Ids.** **Samoa Ids.** **Society Ids.** **Austral Ids.** **Rupa Id.**

southeast of the Austral group, where Mr. Beck took a number of specimens in April, 1921, and in February, 1922.

GENERAL HABITS

HAUNTS. The Australian Duck may be called the Mallard of the South Pacific, and resembles its northern relative very closely in all its habits and mode of life. It frequents "swamps, lagoons, scrub-lined rivers, creeks and waterholes, also estuarine areas, bays and inlets, especially those covered at the sides with dwarf bushes" (North, 1913). On many of the smaller islands, and also in New Zealand, the species is more commonly found on the coasts; its movements are probably governed by the rainfall and it is numerous in the interior only when the country has been inundated. It is found in very diverse kinds of country: on coral islands, on the crater lakes of Java (Koningsberger, 1915) and in one case at an elevation of 12,000 feet on Lombok (Hartert, 1896a).

WARINESS. Where constantly persecuted, as is the case in the settled parts of Australia, the Black Duck is exceedingly shy and wary and quite as well able to take care of itself as are its near relatives. In less frequented regions the birds are naturally much tamer. One writer (Travers, 1872) considered them less shy than the New Zealand Sheldrake (*Casarca variegata*). But they respond readily to protection, and in the garden-ponds in and about Perth, Australia, they have become so tame that they allow themselves to be fed by children though they will not take food from the hand. In the evening these same birds repair to near-by mud-flats where they become as shy as ever (Carter and Mathews, 1920). Mathews (1914–15) quotes a note from Carter concerning their habits in southwestern Australia. In a tank two hundred yards from the house the birds became so tame that they would come to the stables and stockyards to pick up corn among the horses and cattle. At milking time they actually fed underneath the cows, within five yards of where a man was milking. W. W. Smith (1897) speaks of certain pinioned birds on a domain in New Zealand that would not only follow visitors for food but would lie still and allow themselves to be stroked while being fed.

DAILY MOVEMENTS. The Australian Duck is crepuscular in its habits, and evidently becomes entirely nocturnal in settled districts.

GAIT, SWIMMING, DIVING, FLIGHT. There is nothing characteristic about the posture of this bird, either on the water or on the land. At a small distance, only an expert can distinguish it from our North American Black Duck. On account of its tree-breeding habits it necessarily perches more frequently than the Mallard. It is not known to dive except when wounded. But the young dive as freely as those of all surface-feeding ducks.

It was commonly stated by Australians that this duck could outfly any of the birds of prey, but Goudie (1899) quotes a letter from his brother in which the latter recounts an instance where a hawk (species unknown) struck one down. They usually fly in small parties up to twenty or thirty, and do not flock together like Tree Ducks and some other Australian species (Berney, 1907). Large congregations are, however, occasionally found, and in the Ulmarra Swamps (New South Wales) they have been described as rising with a sound like the distant roar of thunder (Savidge, in North, 1913).

Association with other Species. Occasionally the Black Duck is seen in company with other species, notably the Gray Teal (*Anas gibberifrons*) and the White-eyed Duck (*Nyroca australis*), according to Keartland (North, 1898). On the coasts they have also been observed resting on the sand-bars with gulls and cormorants (Buller, 1888).

Voice. Specimens which I have kept and bred for many years always seemed to me extremely quiet. Their notes, so far as I recall, are exactly like those of the Mallard.

Food. These birds are strictly surface-feeders, and their diet consists of a great variety of aquatic plants and animals, according to locality. Mellor (in Mathews, 1914–15) says they live on seeds of grass or aquatic plants, also the leaves of various plants, and they are very fond of "dock seed." In New Zealand they seem to be especially fond of green beetles and the stingless gnats (*nahonaho*), which "swarm in countless myriads over all the waters in the lake district"; and in the gullets have been found also the seeds of *Triglochin triandrum* and of various species of *Lemna* (Buller, 1888). In the Murray River district (Australia) both the adults and the young like to fish about the willows and pussy-tail weeds, in search of shrimps and little "yabbies"; they seem to adopt a mass method in "bristling" the shrimps, just as the pelicans do with the beach fishes (R. Hall, 1909). Buller (1905) mentions their feeding on the spawn of eels with which food their crops were distended. Writing of New South Wales, Mr. Austin (in North, 1913) speaks of their frequenting the wheat paddocks at harvesting time. He thinks wheat their principal food when they can get it and says nearly all the Black Ducks he shot in March had wheat in them, "some of them great quantities." Hutton and Drummond (1905) say that these ducks frequent the stubble-fields in New Zealand also, and are especially partial to pea stubbles.

Courtship and Nesting. The breeding season extends throughout the entire year, and in Australia as elsewhere is very irregular. In New South Wales the Black

Duck is a very early breeder, usually commencing in July and continuing until the end of December or the end of January, sometimes even into March and April, depending on the rainfall (North, 1913). In Queensland fresh eggs have been taken at the end of October and April (North, 1913), but the regular season there appears to be from January to April (Berney, 1907). July and August seem to be the usual breeding months in Tasmania (Mathews, 1914–15), though Legge (1905) speaks of young two weeks old being taken there in March. In central Australia young have been found in May and June (North, 1896). In northern Australia they breed mostly in May, a few in March and April (D. Le Souef, 1903), while in northwestern Australia fresh eggs have been found in January and February and young in late June and August (North, 1898). Carter and Mathews (1920) say the birds breed from July to September in southwestern Australia, and White (in Mathews, 1914–15) gives August and September as the breeding season in South Australia. For New Zealand there are records for September, October and January (Buller, 1888, 1905). A nest was found on New Caledonia on October 15 (E. L. and E. L. C. Layard, 1882) and on Sunday Island, Kermadec group, nests were taken on October 1 and 22 (Oliver, 1913). In the Bismarck Archipelago it is said to breed during the southeast monsoon, but not during the northwest (W. Meyer, 1909).

Unfortunately I never saw my own birds display, nor do I know of any satisfactory description of the behavior during the mating period. In spite of the unspecialized plumage of the male he evidently has a definite type of display, for Finn (1919) noticed that they reared up and courtesied like a Mallard, and Heinroth (1911) also remarked the resemblance between the display in this species and in the Mallard.

Most writers agree in saying that where hollow trees, especially the red gum, are available, these ducks take advantage of elevated situations in which to build the nest. Very often, however, they nest on the ground, either in rushes near the water, on tussocks or on the open plains. They are even fond of standing crops for nest cover (White, in Mathews, 1914–15). There are many instances of their choosing the abandoned nests of crows, ravens, magpies and even in one case the nest of an eagle-hawk. In New Zealand they seem to nest in trees less frequently than in Australia (Buller, 1888; Hutton and Drummond, 1905). Nests located in trees are usually at low elevations, but some have been found as high as twenty and even forty feet (Avicultural Mag., ser. 1, vol. 8, p. 74, 1902).

The size of the clutch is variable and may depend on the rainfall and consequent food supply. One writer (Travers, 1872) thinks the brood barely exceeds five, but others place it all the way from six and seven to eight or ten. Mathews (1914–15) regards thirteen as the maximum. A. C. Stone (1912) speaks of fifteen as the maximum, and Buller (1905) records a nest found in New Zealand containing seventeen eggs. The nest was on the top of Cook's Rock in Mercury Bay, in a natural hollow

about forty feet above the level of the open sea. The clutch was possibly the work of two females. From a careful examination of the literature it would seem that the normal clutch is smaller than that of the Mallard: about seven or eight. The eggs are smooth and slightly glossy, pale greenish white, 56–58 mm. by 41–42.5 mm. (Mathews, 1914–15). The incubation period is evidently the same as that of the Mallard, twenty-seven to twenty-eight days (Heinroth, 1908). There is an interesting case on record of a nest being flooded for two hours, during which the duck swam about over the nest-site in evident distress. When the water had gone down she resumed incubation and eventually hatched out all her eggs (Dennis, 1907).

The fact that some ducks nest in trees has long made them the subject of tales, fabulous and otherwise, as to how they convey the young to the ground or to the water. Unfortunately the reports of the more unusual methods reach us only at second or third hand. The really reliable, direct observations indicate that the young of Australian Black Duck are coaxed into jumping down from the nest as is the case with other members of the family.

I have some very interesting notes on the non-breeding of Australian Ducks and other water-birds during drought years, kindly sent in by Mr. Edwin Ashby of Blackwood, South Australia. It seems that during times of great drought in central and northern Australia great quantities of this and other species come down to the Murray River district and other parts of South Australia. Sometimes these strangers remain through one or even more breeding seasons without pairing, or showing any signs of breeding. More remarkable still, the influx of outsiders seems to stop the local stock from breeding also. When the drought is broken in the north, these hosts of water-fowl return to their former haunts.

Status. All the older writers describe this species as extremely abundant, particularly during periods of flood. In the early '80's in the Clarence River district it was so numerous that it was no uncommon thing for a couple of guns to bag over one hundred in a single day (Savidge, in North, 1913). Though diminished in numbers they are still plentiful except in the drained and settled districts, and form the mainstay of the Australian duck-shooter. A recent letter from a correspondent, Mr. Charles T. Barnard, a resident for 48 years in central Queensland, describes the Australian Ducks in general as holding their own, and well protected by laws in the more settled parts. Farther back their breeding places are practically undisturbed (by man at least). In New Zealand the species was reported diminishing as early as 1873 (in 1876 seven thousand moulting ducks, mostly of this species, were caught on one lake in three days, in the Bay of Plenty district), but even at that time it was receiving the protection of the Colonial Government, with the result that in 1905 it was holding its ground (Hutton and Drummond, 1905). Colonel Cradock (1904) estimated that it comprised 80% of all the wild ducks in the country. The Mallard

has been introduced by various acclimatization societies, and by the Government, into many parts of New Zealand and according to Buller (1905) it is gradually supplanting the native ducks and hybridizing with them.

On some of the Pacific Islands this duck is undoubtedly becoming very scarce, due to the introduction of various predatory mammals, chiefly the mongoose. On Viti Levu (Fiji group), where it formerly existed in enormous numbers, it fell an easy prey to the latter animal and it is now extremely rare, though there are still considerable numbers on Ovalau (P. H. Bahr, 1912). Mr. Norman Hall writes me that in Tahiti ducks are now very scarce, while in the Kermadec group, according to Cheeseman (1891), this duck has been scarce since the eruption of 1872.

Enemies. In Australia the introduced fox, domestic cat, and ferret are the most persistent enemies of the water-fowl. Mr. Charles M. Hoy, collecting for the United States National Museum, writes me that the ferret is the least widely distributed, and that he himself found it only on the north coast of New South Wales. The fox has increased very rapidly, and is now found all over Queensland, New South Wales, Victoria and South Australia, and has begun to invade West Australia. He thinks the fox is doing by far the greatest damage to ducks, besides creating great havoc among the swans. It seems very likely that all ducks that nest on the ground will eventually be exterminated unless they can find islands in swamps and lakes sufficient for their needs. The cat is now distributed all over, including the desert interior, and is the next worst enemy of ducks. While it prefers smaller birds Mr. Hoy considers it an important enemy. The ferret he has never seen attack ducks but he thinks it probably destroys young in the nest.

The Black-cheeked Falcon (*Falco melanogenys*) has been seen to kill twelve ducks of this and other species in one hour, without making any attempt to pick up the kills (F. C. Morse, 1919).

Mr. Charles T. Barnard writes to me from Duaranga (*via* Rockhampton), Australia, that some of the hawks seem to be the principal natural enemies of the ducks, the Radiated Goshawk (*Astur fasciatus*) in particular and to a lesser degree the Little Eagle (*Hieraætus pennatus*) both of which strike ducks while on the wing. The Whistling Eagle (*Haliastur sphenurus*) attempts to catch young ducks, although he has never actually seen it succeed. Mr. Barnard also names the water-rat (*Hydromys chrysogaster*) as a possible enemy, for it quickly destroys all wounded ducks.

Food Value. The flesh is excellent, especially at the beginning of the shooting season, when the birds are fat. Those from the interior lakes are quite naturally of a better flavor than those taken on the coasts. Buller (1888) regards it as perhaps the most valuable of the indigenous birds of New Zealand. The birds reach about 2.5 pounds (1.13 kilograms) in weight, a little less than Mallard, and invariably

brought the highest market price in Melbourne (R. Hall, 1909). I can testify myself to the excellent eating qualities of hybrids between this species and the Mallard, many of which I formerly raised on my ponds at Wenham, Massachusetts.

MacPherson (1897) tells of a Maori method of cooking and preserving ducks in their own fat so that they would keep in calabashes for from one to two years.

HUNT. Before the advent of white men the Maoris of New Zealand undoubtedly paid much attention to the capture of ducks. The ducks were caught in great numbers by snares hung from a cord stretched across a river or lake-arm. Great duck drives on carefully preserved lakes took place during the moulting season, and were accompanied by solemn ceremonies on the part of the natives. Specially trained dogs were also used in hunting the moulting ducks. The Maori was also expert in capturing all species of ducks by swimming after them, seizing their feet and drawing them under (MacPherson, 1897). Colonel Cradock (1904) gives a good account of duck-shooting on the North Island. The sportsman is paddled up a river by a native in his canoe, and no paddlers are said to be more expert in getting silently up to ducks, which are shot as they rise out of the rushes on either bank.

In western Australia the aborigines apparently lived on fish and turtles and did not attempt to snare birds. But in eastern Australia horizontal nets overhanging a river and suspended from lofty trees were used as drop-nets by the natives. A rather original method is described by Smyth (in MacPherson, 1897): a net sixty yards in length is stretched across a water course, with its lower part three or four feet above the water. One man proceeds up the river and cautiously moves so as to cause the ducks to swim toward the net. When they are near enough he makes them rise and at the same time another native near the net throws up a piece of bark shaped like a hawk, and utters the cry of that bird. The ducks at that moment dip down and many are caught in the net. Sometimes as many as three dozen are taken at one time in this way.

Market shooting was an important occupation in the earlier days in eastern Australia, and swivel and punt guns were used, until forbidden by law.

BEHAVIOR IN CAPTIVITY. A specimen of this duck was first received by the London Zoological Gardens in 1860. Others followed in 1863, 1865, 1866, but none bred until 1869. From that time till 1878 it nested regularly, the dates of hatching being nearly all for late June (P. L. Sclater, 1880). It has bred freely in various zoölogical gardens of Europe, and Mr. Le Souëf writes me that it has done so in the Melbourne Gardens also. A mated pair which I kept for six or seven years bred every spring, and from them I reared at least forty young specimens. Two individuals which I reared at Wenham, Massachusetts, in 1914, were permitted the use of their wings

and stayed around the ponds till December 17, when they disappeared, evidently making a local migration, perhaps to the neighboring seashore.

The average longevity of 45 specimens in the London Gardens was 42 months, the maximum being nearly 16 years (P. C. Mitchell, 1911). The price in England before the war was about 30 shillings to £2 10*s*. per pair. In America they brought from $20.00 to $45.00 per pair. A recent price (November, 1920) in New York was even higher, namely $60.00 per pair.

Hybrids. A wild hybrid sent to Buller in 1892 was at first supposed to be a cross with a Blue Mountain Duck (*Hymenolæmus malacorhynchus*), but Buller (1905) as well as Salvadori (1895) now seem inclined to place it as a hybrid of Black Duck and Domestic Duck. Zietz (1912) has described fifteen wild hybrids between the Black Duck and the Gray Teal (*Anas gibberifrons*) and between the Black Duck and the Australian Shoveller (*Spatula rhynchotis*). In captivity it crosses readily with the Mallard, with the Indian Spot-bill (*Anas pœcilorhyncha*) and the African Yellow-bill (*Anas undulata*). All these hybrids and various combinations of several of them are fertile, both *inter se* and with the parents (Poll, 1911). Mr. Le Souëf writes me that in the Melbourne Gardens he has crossed them with Muscovy Ducks (*Cairina moschata*) and that the hybrids proved sterile, though they laid small eggs.

GEOGRAPHICAL RACES

It has long been noted by ornithologists that specimens of this duck from Polynesia are smaller than those from Australia, but the difference is not marked, and by some is not considered worthy of special recognition. Hartlaub and Finsch (1872), and Finsch (1875) separated birds from the Pelew Isles as a smaller race, but Salvadori (1895) did not recognize it. The truth is that birds from the whole of Polynesia, from Tahiti to the Pelew Isles are small, and probably belong to the same race, while a larger bird is said to occur in Savu, Timor and Sumba (Hartert, 1905). An intermediate race, described by J. H. Riley (1919) from Celebes seems to be larger than *Anas superciliosa pelewensis* and smaller than *Anas s. rogersi*. Birds from Australia and New Zealand are large, those from the latter being the largest of all. The various color differences which have been used in describing these races seem to me of very doubtful value. It is possible that a large series, especially from outlying islands, might clear up the situation, but at present only the following four races, one of very doubtful value, can be considered.

ANAS SUPERCILIOSA SUPERCILIOSA Gmelin

Anas superciliosa Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 1, p. 537, 1788.

Characters: Size large, wing 250–272 mm.?

Range: Confined to New Zealand.

(?) *ANAS SUPERCILIOSA ROGERSI* Mathews

Anas superciliosa rogersi Mathews, Austral Avian Rec., vol. 1, p. 33, 1912.

CHARACTERS: Said to be somewhat smaller and lighter-colored than birds from New Zealand. This last character is not apparent in the specimens at hand. Wing 254–274 mm. (U.S. National Museum and Museum of Comparative Zoölogy specimens.)

RANGE: Confined to Australia and Tasmania.

ANAS SUPERCILIOSA PERCNA RILEY

Anas superciliosa percna Riley, Proc. Biol. Soc. Washington, vol. 32, p. 98, 1919.

CHARACTERS: Larger than *A. s. pelewensis* and smaller than *A. s. rogersi*. Wing 240–266 mm. (U.S. National Museum specimens).

RANGE: Celebes, and possibly Java and neighboring islands.

ANAS SUPERCILIOSA PELEWENSIS HARTLAUB AND FINSCH

Anas superciliosa pelewensis Hartlaub and Finsch, Proc. Zool. Soc. London, 1872, p. 108.

CHARACTERS: Smaller; wing 216–242 mm. (U.S. National Museum specimens).

RANGE: Java, Celebes, Pelew Isles, northern New Guinea, Solomon, Fiji, Samoan and Tonga Islands, and Tahiti.

AFRICAN YELLOW-BILLED DUCK

ANAS UNDULATA Dubois

(Plate 25)

Synonymy

Anas flavirostris Smith (*nec* Vieillot), Cat. South African Mus., p. 36, 1837.

Anas undulata Dubois, Ornith. Gallerie, p. 119, pl. 77, 1839.

Anas xanthorhyncha Forster, Icones Ined., pl. 72; Descriptiones Animalium, p. 45, 1844.

Anas capensis Lichtenstein (*nec* Gmelin), Verzeichniss d. Säugethiere und Vögel, p. 20, 1842.

Anas ruppelli Blyth (*sic*), Journ. Asiatic Soc. Bengal, vol. 24, p. 265, 1856.

Querquedula xanthorhyncha Sharpe, Ibis, ser. 6, vol. 4, p. 541, 1892.

Vernacular Names

English: Yellow-billed Duck, African Yellow-billed Duck.

French: Canard à bec orange.

German: Gelbschnabel Ente.

Dutch: Geelbec — (South Africa).

Arabic: Boumon.

DESCRIPTION

Adult Male: General appearance like a female Mallard, but head and neck much darker and browner. Margins of the feathers of mantle and scapulars narrowly edged with very pale buff and gray. Lesser wing-coverts edged with white, and not plain-colored as in female Mallard. Speculum very similar to that of Mallard, varying from purple to green and framed with black and white bars.

Iris dark brown. Bill orange-yellow, with the middle of the culmen and the nail black. Legs and feet dark brown (Neave, 1910) and black, or tinged with yellow according to other writers.

Wing 246–255 mm.; tarsus 45–46; bill 49–52.

Female: There is no real difference in the plumage of this sex as far as I have been able to see. The head may be slightly less dark and rich in color than in the male. Color of soft parts same as in male.

Immature Specimens: Very similar, but the heads are apparently browner than in old birds. Mr. F. E. Blaauw says the markings of the feathers are less well defined.

Young in Down: The whole of the under side, including throat and cheeks golden yellow. A dark band begins at the base of the bill, widens over the occiput, and becomes narrower over the back of the neck to join the brownish black of the upper side. The brown of the upper side runs into the yellow of the breast for about a centimeter on each side. A thin black line runs through each eye, meeting the brown of the back of the neck. There is a blackish patch over each ear. There is a yellow spot on each side of the back at the base of the wings and a yellow streak over each wing, also a yellow spot on each side of the back at the base of the tail and one above each thigh. The legs,

AFRICAN YELLOW-BILLED DUCK AFRICAN BLACK DUCK MALLARD DRAKE

Made in Great Britain

feet, and bill are black (Blaauw, 1919). Rogeron (1903) notes that it would be impossible to distinguish them from young Mallards, except for the bill, which very soon takes on a yellow tint. The many specimens which I saw in the Leyden Museum and also in the British Museum led me to think it almost impossible to tell them from Mallards. In some, the dark ocular streak does not go forward of the eye and in others the yellow of the under side is very sharply defined from the brown of the upper side. But there are so many little variations in the down plumage of ducks that comparison of a few specimens is often misleading.

Remarks on Proposed Races: The material which I have seen is insufficient to decide the validity of the separation which has been proposed. A northern form was recognized by Blyth (1856), but was not considered valid by Salvadori (1895). It was re-instated by Neumann (1904). In view of the fact that speculum-color appears to be a character of very doubtful value, and because birds with green specula have been noted in South Africa (Sassi, 1912), I have thought it best not to recognize *A. u. ruppelli* from northeastern Africa (Shoa).

DISTRIBUTION

Like many tropical species the Yellow-billed Duck is only locally migratory, and is found throughout all parts of its range at very different seasons. It is primarily a South African species, and south of 15° south latitude or at least 20° south latitude it is the commonest duck. In the east, however, the species is found as far north as Abyssinia where it is common and breeds, especially in the highlands of the south. Von Heuglin (1873) found it as far north as Lake Tana; Salvadori (1884, 1888) has repeatedly recorded it from Lakes Addo and Cialalaka and other localities in Shoa, as well as from Auasc on the Italo-Ethiopian frontier (Salvadori, 1912). The U.S. National Museum has specimens from the Amssi Plateau. Blanford (1870), and Ogilvie-Grant and Reid (1901) have recorded it from the highlands: A. D. Smith (Sharpe, 1895) and Peel (1900) found it at Sheik Mohammed in western Somaliland, and von Erlanger (1905) states that it is especially common and breeds between Ginir and Addis-Ababa and on the Maki River as far as Addis-Ababa. But the species seems in this region to be confined to Abyssinia. I find no records for the Sudan nor for either British or Italian Somaliland proper.

Abyssinia

Farther south it is common and presumably breeds on the Toro Lakes, Uganda (V. van Someren, 1916); and is common also in British East Africa (Horsbrugh, 1912; etc.) whence it has been recorded for Lake Naivasha at altitudes up to 2000 meters and where it was found at Kagio, Kutu and at Kenia, breeding at altitudes of 2700 meters (Lönnberg, 1912). It is apparently common also in former German East Africa where it has been found at Iringa (Reichenow, 1898), while from Victoria Nyanza it has been recorded by Reichenow (1894). Sassi (1912) found it in the Urundi region and Emin Pasha (1891) met with it at Bukoba on the west shore of the lake. Johnston (1886) has recorded the species for Kilimandjaro where it was found as high up as 11,000 feet. What the status of the species may be to the west of the lake region it is very difficult to say. Very likely it occurs throughout Congo Free State, for Johnston (1884) states that he found it at Stanley Pool and at suitable places far up the Congo River, while Neave (1910) has recorded it for the Katanga, Bangweolo and Kalungwisi regions, up to 4200 feet, in the southeastern Congo. In Portuguese West Africa it is, however, a rare bird, having to my knowledge been recorded only from Huilla and Caconda in the interior (Barboza de Bocage, 1877-81). Andersson (1872) did not meet with it in former German West Africa and I believe it has never yet been found there; so that at best the species must be regarded as very rare on the west coast north to the Congo. Rochebrune's (1883-85) statement that it is rare in Senegambia and that specimens have been taken north to the lower Gambia, requires further confirmation. In Rhodesia and the other British South African colonies it is, however, very abundant (Layard, 1875–84). Holub and von Pelzeln (1882)

East Africa

Congo

Rhodesia

met with it at Shesheke on the upper Zambesi, but in northern Rhodesia and even in Mashonaland it does not appear to be very common (G. A. K. Marshall, 1900; Neave, 1910; Shelley, 1882). For Nyassaland we have only Whyte's (Shelley, 1894) record for the Palombi River which leads me to suppose that the species is rather rarer north of 20° south latitude. Still it is common in Bechuanaland on Lake Ngami and the Botletle River (Andersson, 1872) and at Nocana on the Okavango River (Fleck, 1894). In the Transvaal it is very common on the Wakkerstroom (W. L. Sclater, 1912a) and breeds on the Potchefstroom (Horsbrugh, 1912). It has also been recorded from Pretoria (F. Oates, 1881).

Transvaal

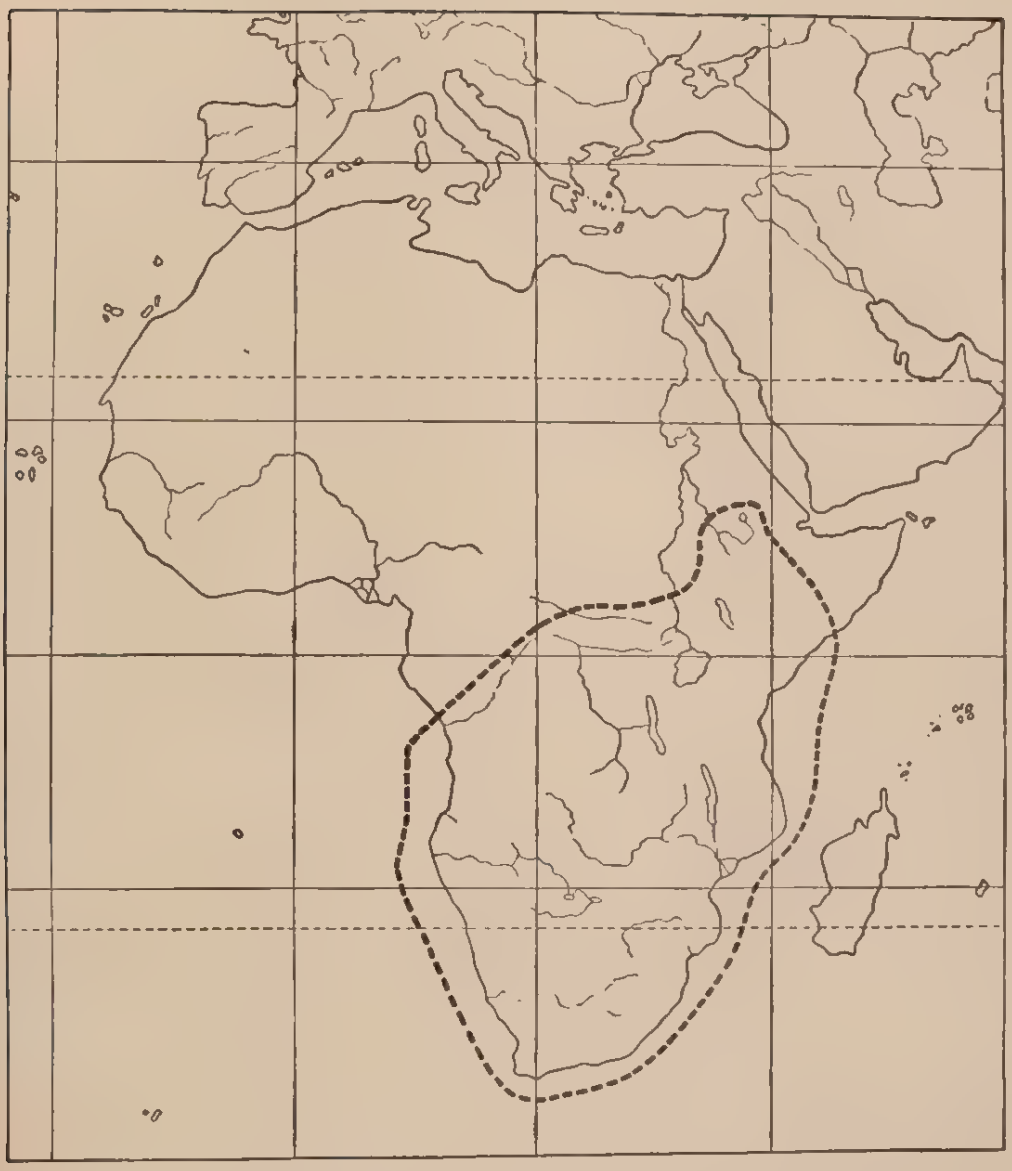
Nowhere, however, does the species appear to be so common as in the region south of the Orange River. In the west, though he did not find it in German West Africa, Andersson (1872) remarks that it is abundant south of the Orange, and its abundance in Cape Colony is also well attested by others. The South African Museum has specimens from the Cape and Mossel Bay division, and Layard (1875–84) has recorded its nesting in Vogel Vlei in Paarl, and Zoetendal's Vlei in Bredasdorp. According to Brown it is fairly common at Port Elizabeth, but Wood states that it is rare at East London (*fide* Stark and Sclater, 1906). This is not unexpected considering that the species is distinctly a fresh-water bird and is therefore rare on the coasts. Trevelyan (*fide* Stark and Sclater, 1906) has recorded it for King William's Town where it used to be abundant but is now growing rare (Clifton, 1888). It is not common on the St. John's River, according to Shortridge (1904). Holub and von Pelzeln (1882) found it near Taungs, West Griqualand. In East Griqualand the species breeds (Horsbrugh, 1912) and is very common at Matatiele (C. G. Davies, 1908). It is found also in Natal, though not on the coast (Horsbrugh, 1912). Buckley (1874) and Barratt (1876) have recorded it from the Mooi River in this Colony, while the Woodwards (1899) found it at Weenen and Maritzburg, and Butler, Feilden and Reid (1882) in the Newcastle district. T. Ayres (1880) states that it breeds in Natal. On the west side of the Drakensbergen the species is very common in Basutoland (Murray, *fide* Stark and Sclater, 1906) and has been found in the Orange River Colony on the Rhenoster River (T. Ayres, 1880) and breeding in the Harrismith district (Sparrow, *fide* Stark and Sclater, 1906). Hamilton (*ibid.*) has recorded it from Vredefort Road Station in the same Colony.

South Africa

GENERAL HABITS

Haunts. One of the commonest and, to the South African sportsman, most important ducks, this species is found all over the open country, on *vleis* (lakes) and rivers. Like other South African ducks they come and go with the rains. On the Orange and Limpopo Rivers they are found in reedy ponds, salt lakes and reedy streams (Holub and von Pelzeln, 1882). Farther north, in the Kilimandjaro region they are found at elevations as high as 11,000 feet (Johnston, 1886), and in the Masai country they have been found up to 6500 feet (G. A. Fischer, 1884). In the mountain streams of southern Abyssinia, and about Lake Tana it is a very common bird (von Erlanger, 1905; von Heuglin, 1873; etc.) and is found at altitudes of from 8000 to 9000 feet.

Wariness. By nature the Yellow-bill does not seem to be a wary bird, but in South Africa, where it has been persecuted a good deal, it is said to exhibit "all the wariness and caution of its race" (Layard, 1875–84). Ayres (Layard, 1875–84) says that in Natal he frequently found them lying so close in the rushes, where the water was about knee-deep, as to allow themselves to be almost trodden on. Most



MAP 36. Distribution of African Yellow-billed Duck (*Anas undulata*)

other observers describe them as more tame than other ducks, such as *Anas sparsa* or *Casarca ferruginea* (Ogilvie-Grant, 1900; Buckley, 1874). In Abyssinia the Gallas are said sometimes to kill them with sticks shaped like Australian boomerangs (Ogilvie-Grant, 1900).

Gait, Swimming, Diving, Flight. On land and in the water its appearance is absolutely Mallardlike, although it has a way of exposing the very beautiful speculum rather more than most true ducks do. Its style of flight, so far as I know, is indistinguishable from that of the Mallard, but when on the wing it is said to appear bluish in color (Ayres, in Layard, 1875–84). It is apparently not usually found in large flocks, but like the other Mallardlike ducks it stays in pairs or in small companies of from six to twenty (W. L. Sclater, 1912a; *et al.*).

Voice. The notes of the Yellow-bill are indistinguishable from those of the Mallard (Rogeron, 1903; Horsbrugh, 1912). I can find no description of the tracheal bulb.

Food. No good observations as to the stomach-contents are to be found in the literature, but a few writers have remarked their feeding on a vegetable diet. When the grain is ripe they flight to the grain-fields in the evening, returning to the water to wash and rest (Horsbrugh, 1912).

Courtship and Nesting. The breeding season in South Africa falls mostly in October (Layard, 1875–84). Nevertheless nests have been found in April (Sparrow, 1907). Over the rest of its range the season is exceedingly irregular. In the Transvaal the birds were just commencing to moult in March and April, and five quite young birds were found on April 4 (W. L. Sclater, 1912a). In East Griqualand broods have been found in April (Horsbrugh, 1912). In the Mt. Kenia region (British East Africa) a female with young in down was found at a high altitude on March 27 (Lönnberg, 1912). For East Africa in general it certainly breeds from February to May (V. van Someren, 1922), and probably at other times. In southern Abyssinia von Erlanger (1905) found it breeding in June, while in the Lake Tana region, according to von Heuglin (1873) it breeds in November and December, and full-grown young were found in March and April.

Heinroth (1911), the only observer who mentions the display, says that it closely resembles that of the Mallard. Pursuit flights just like those seen in so many northern ducks have been noticed during the breeding season. The drakes, says C. G. Davies (1911), pursue the ducks in the air, sometimes circling round to a great height, "the female turning and dodging in every direction, and quacking loudly."

Very little is recorded as to the location of the nest. The birds usually select the

dry *veldt* at a distance from the water, and generally in dense brush (Layard, 1875–84). That such positions are not always chosen is evident from Ayres (in Layard, 1875–84) who says that they build a substantial nest of flags among high rushes, and well elevated above the water. Masterson (1916) notices that the nest is made of rushes, grass and aquatic weeds and is usually placed in the rushes or reeds growing in or along the side of the water; but he once found a nest in long grass on a hillock about three miles away from water.

Layard (1875–84) gives the normal clutch as six, but I am certain that this must be less than the average. Stark and Sclater (1906) place it at six to nine and as many as eleven have been reported. Rogeron (1903) bred many in captivity. He found them very abundant layers and reports that the clutch numbers ten to twelve. Closer observation will probably show that they do not differ much from the Mallard in this respect. The eggs are elliptical, smooth and vary in color from very pale brown to creamy or greenish white (Stark and Sclater, 1906; Masterson, 1916). The length of the incubation period seems to be unknown, but is almost certainly around twenty-six or twenty-seven days.

Status. Recent writers still speak of the Yellow-bill as a very common bird, especially in South Africa, though the gradual settlement of the country unquestionably results in local diminution. As long ago as 1888 it was described as rare where formerly common about King William's Town (Clifton, 1888). The tendency of many of the great South African lakes to dry up must eventually lessen its numbers. On the other hand the sportsmen of South Africa are far more interested in close seasons than they used to be and are creating laws which are becoming effective.

Damage. From its habit of feeding on grain it may occasionally do some damage to crops.

Food Value. The flesh of this duck is described as excellent in all parts of its range, even when the birds are moulting (Buckley, 1874; T. Ayres, 1880; Ogilvie-Grant and Reid, 1901; G. H. Gurney, 1909; *et al.*). In his book on South Africa Bryden (1893) expatiates at length on the splendid condition and flavor of its meat when shot in the Botletle River country.

Hunt. The use of boomerang-like sticks by the natives of Abyssinia has already been referred to. At Vogel Vlei in Cape Colony the farmers of the neighborhood used to assemble each year for a grand hunt after these ducks and the Red-billed Teal (*Anas erythrorhyncha*). The shooters were posted at different parts of this long sheet of water, hidden among the rushes and the bush-covered rocks which jut out

here and there in the shallows. Men were then sent about with long Cape wagon-whips with which they kept up a continual cracking noise nearly as loud as the report of a gun. This kept the birds flying to and fro over the ambuscades.

Behavior in Captivity. The Yellow-bill was first introduced into England by the Earl of Derby, and was obtained by the London Gardens at the sale of the Knowsley collection in 1851. It bred first in 1859 and several times between that date and 1870. The young birds hatched in late May or June (P. L. Sclater, 1880). They were also hatched in the Rotterdam Gardens about 1870 (van Bemmelen, 1872). It has bred freely in continental gardens and was often purchased for £4 per pair. Mr. Blaauw told me that he reared it on his estate at Gooilust, Holland, and I saw a fine stock there in the spring of 1922. The first winter after he got them from Africa he kept them indoors, but after that he found them sufficiently hardy to winter in his ponds.

They have never been imported into America so far as I am aware.

The Yellow-bill adapts itself admirably to life in confinement. It becomes very tame and breeds, according to Rogeron (1903), even more readily than the wild Mallard. In its relations to the female and to other males it is like the true Mallard. In the spring the male seeks out females of its own kind and of the Mallard indiscriminately. If the two species are not kept separate, crossings are inevitable. They will not use nesting boxes, but nest on the ground like wild birds. The clutch Rogeron found to be from ten to twelve. The birds were not particular about their food and in addition to the usual diet fed on acorns. Mr. Hubert D. Astley had a pair which nested for a second time in 1922, bringing out a late brood in November, an unusual occurrence. They seem to be especially hardy and long-lived. One specimen, hatched and raised on Rogeron's place, lived to be eighteen years old, and was given full use of its wings for several years, while in the London Gardens one lived to be 26 years and 7 months old, though the average of eight birds was seven years.

Hybrids. There are no wild hybrids recorded as far as I have learned. In captivity it has crossed freely with Mallard and African Red-billed Ducks (*Anas erythrorhyncha*), more rarely with the Spot-bill (*Anas pœcilorhyncha*) and also with the American Black Duck (*Anas rubripes*) (Poll, 1911). I saw a live specimen of this last cross in Mr. Blaauw's gardens in 1922.

AFRICAN BLACK DUCK

ANAS SPARSA EYTON

(Plate 25)

SYNONYMY

Anas sparsa Eyton, Monograph Anatidæ, p. 142, 1838.

Anas flavirostris G. R. Gray (*nec* Smith), List Birds British Mus., vol. 3, p. 137, 1844.

Anas leucostigma Rüppell, Systematische Uebersicht d. Vögel Nord-Ost-Afrikas, pp. 130, 138, pl. 48, 1845.

Anas guttata Lichtenstein, Nomenclator Avium Mus. Berolini, p. 101, 1854.

VERNACULAR NAMES

English: African Black Duck, Black River Duck, Speckled Duck, White-spotted Duck, White-barred Black Duck.

German: Smith's Ente.

Dutch: Stippeleende.

Zulu: Edada.

Zambesi: Tunta.

DESCRIPTION

ADULT MALE: General color very dark brown to black both above and below, except the sides of the head and neck which are lighter and streaked with black. Scapulars and tertials have several irregular rows of white spots, which also appear as four irregular buff or white bands on the tail. Occasionally the mantle has one or two white spots, and whitish bands may appear on the breast and abdomen. Wing with a blunt carpal spur. A metallic speculum bordered in front by a broad black band and a prominent white band, posteriorly by a wide black, and a narrow white band. Under wing-coverts white and black; axillars white.

Iris dark chestnut. Bill black in South African specimens, or probably dark lead-blue in life (Blaauw, 1917). In East African specimens it is orange with a black saddle-mark on the culmen below nostrils, and with a black nail. Sometimes only the tip and base of culmen are orange. Feet orange with webs black.

Wing 239–256 mm.; bill 43–47; tarsus 41–47.

ADULT FEMALE: Similar to the male but somewhat smaller (Salvadori, 1895).

IMMATURE PLUMAGES: Mr. Blaauw (1917) who bred this species from South African examples describes the developing young as follows: At ten days old the bills of the chicks had become bluish lead-color and the birds had grown very rapidly. At the age of twenty-four days the first feathers appeared, tail-feathers first, and then the shoulder (scapular) feathers. When fully feathered they were very similar to adults, but more brownish, and the whole under side silvery white. Upper side, head and neck excepted, but including tail-coverts, with a number of buff spots on edges to the feathers. No white spots. Blue wing-bar with its white and black edgings present, but duller in color. Upper mandible blue; nail black. Under side of under mandible flesh-color. At about seven weeks the black saddle-mark on the bill appears, but is not prominent until later. Toward the end of

August (at about three months old) the buff spots on upper side begin to change to white. At the end of September the birds had begun to moult, and a month later adult plumage was complete.

YOUNG IN DOWN: Differs from the young of the Mallard as follows (Blaauw, 1917): upper side and band around breast, which does not quite meet in front, black. Five or six yellow spots on each side of the body. Sides of the head yellow, with a black line through the eye, and a second one a little lower down. Under side white, slightly tinged with yellow. Bill black; legs and toes pale dusky yellow in front, webs and hind part of legs dusky.

The specimens I have seen are very dark above and buff color below. There is a great deal of dark pattern below the eye, consisting of two ill-defined face-stripes, one running through the eye and one from culmen to aural region. There are two light spots above the eye, one in front of it and one behind it. The wing, scapular, side and rump spots are the same as in many other ducks.

DISTRIBUTION

THE African Black Duck is found over essentially the same range as the Yellow-billed Duck (*Anas undulata*) but it is much more rare and more confined to streams and hill country. It is found at various times of the year throughout its range but there is some indication that at least some of the birds leave the northern and southern extremities of the range and draw nearer the equator when the weather grows colder. The northernmost limit of its occurrence is Abyssinia where it is found in the north about Lake Tana, and where it breeds (von Heuglin, 1873). Salvadori (1884, 1888) has recorded it from Sululta and from Galla Galan (Shoa) and this region seems to be its chief habitat in the north. According to Ogilvie-Grant (1900) it is to be met with almost exclusively on the high plateaux of central Abyssinia, but other writers speak of it as more common in the southern districts. Thus both Salvadori (1912) and von Erlanger (1905) record it from the Arussi-Gallaland region as occurring on the mountain streams at altitudes of 2000 meters and even 2600 meters. Von Erlanger (1905) in fact states that he met with it only at altitudes of 2600 meters and above, and that it was common there. He has also reported it from Tumadu in the Niam-Niam region. According to Ogilvie-Grant and Reid (1901) it has been found also near Myeesa, southern Abyssinia. There is no indication of its occurring in the low country of eastern Abyssinia or in Somaliland, nor does it appear to range westward to the Nile in this latitude.

Abyssinia

I have been unable to find many records of its occurrence in British East Africa beyond Hinde's (1900) remark that the species may be regularly seen in Masailand from October to January, and R. B. Sharpe's note (1900) of a pair taken on Lake Höhnel, west slope of Mt. Kenia at an altitude of 13,000 feet in September, 1899. Unquestionably it inhabits the smaller lakes and rivers of the Province (V. van Someren, 1922). It has been reported from the Buddu, Toro and Ruwenzori regions of Uganda, where it has been met with at altitudes up to 12,000 feet and it breeds in the Mubuku Valley district (V. van Someren, 1916; Ogilvie-Grant, 1910). In former German East Africa it was taken at Kibonota on Kilimandjaro at 1400 meters (Sjöstedt, 1910) and Stierling (Reichenow, 1898) found it at Iringa. How far west it may extend beyond the lakes I am unable to say. Mr. J. P. Chapin (*in litt*.) states that he took specimens but found the species rare on the Ituri River, northeastern Congo Free State and the fact that specimens have been taken in the Cameroun (February, 1908) at Bamenda and at another locality 200 miles inland (Reichenow, 1910, 1911) indicates the possibility of its extending west through the entire Congo basin. Even in localities where regularly found the birds are so rare and shy that they may well have been overlooked by the few explorers who have been through central Africa. But at any rate this duck must be very rare indeed west of the lakes and north of the Zambesi.

East Africa

Congo

In Rhodesia the species has been taken near Victoria (Sclater, *fide* Stark and Sclater, 1906) and

Kirk (1864) states that it is a not common breeding bird on the Zambesi. Mouritz (1915) has recorded its breeding in the Matoppo district of southern Rhodesia. It has been found a few times in Portuguese East Africa, on the Goronzoga River (W. L. Sclater, 1912a), at Somba (Shelley, 1894a) and in Gazaland, where it is the commonest duck in the uplands, especially at Jihu, on the upper Buzi and on the Umswirizwi (Swynnerton, 1908). W. L. Sclater (1912a) has recorded it from Tambarara, Gazaland. I find no evidence of its occurrence in southern Rhodesia but in Bechuanaland it has been met with on the Botletle River (Bryden, 1893). It appears to be of somewhat more frequent occurrence in the Transvaal, where it breeds on the Potchefstroom (Horsbrugh, 1912) and it is said to be the commonest duck on the Olifant River (Atmore, *fide* Reichenow, 1900). Buckley (1874) has recorded it from Pretoria and T. Ayres (1876, p. 433) states that it has been met with on the Potchefstroom and at Lydenburg. It is known also from Kaffir Lake in the Orange River Colony (Krebs, *fide* Reichenow, 1900). In Basutoland it is said to be common on the mountain streams (Murray, *fide* Stark and Sclater, 1906) and Layard (1875–84) states that it breeds at Maseru. The species breeds also in Natal, on the Mgoye Hills in Zululand (W. L. Sclater, 1912a), on the Umkusi River in Zululand (R. B. and J. D. S. Woodward, 1899) and very likely also in more southerly districts. It has been found at Durban (T. Ayres, 1880), on the Umbile River near Pinetown (Stark, *fide* Stark and Sclater, 1906), at Maritzburg (Buckley, 1874), on the Ingagane River at Newcastle (Reide, *fide* Stark and Sclater, 1906) and on the Mooi River (T. Ayres, 1880).

Rhodesia

Transvaal

Natal

Although widely distributed in Cape Colony, the present species seems to be everywhere rare and is met with only in small numbers, usually only a couple at a time. Indeed C. H. T. Whitehead (1903) states that it is common on the Orange River, but this is exceptional. It has been found breeding on the Buffalo River near King William's Town (Trevelyan, *fide* Stark and Sclater, 1906; Pym, *ibid.*). In the east it is rare on the streams about Matatiele, East Griqualand (C. G. Davies, 1908) and it is known also from St. John's River, Pondoland (Shortridge, 1904). Victorin (*fide* Stark and Sclater, 1906) has reported it from Knysna, and Rickard (*fide* Stark and Sclater, 1906) from Port Elizabeth. The British Museum has a specimen from Grahamstown. Seimund (*fide* Stark and Sclater, 1906) found it at Deelfontein, Bradshaw (*ibid.*) on the Orange River near Upington, C. H. T. Whitehead (1903) at Aliwal, and Holub and von Pelzeln (1882) on the Harts River near Taungs. It is probably to be found throughout the course of the Orange, though not in the desert areas to the north. On the west coast it has been found in former German West Africa along the course of the Great Fish River, Namaqualand; and Andersson (1872), who met with it in this region, is inclined to think that it is not very uncommon there during the rains. It was also found at Quindumbo, in Angola (Barboza de Bocage, 1877–81).

Cape Colony

GENERAL HABITS

HAUNTS. The African Black Duck, not a very characteristic species of the genus *Anas*, is quite different in its habits from the Yellow-bill (*Anas undulata*) though it inhabits the same general region. It is usually found on the rapid streams of hilly districts. In South Africa, however, it is common at times on reed-covered, flowing waters in rather low-lying country, and is seldom seen on stagnant waters (Holub and von Pelzeln, 1882). C. G. Davies (1911) tells us that it seldom visits the *vleis* except when the rivers are flooded by heavy rains. Almost everywhere it is a solitary species, found only in small numbers and rarely seen. Layard (1875–84) considers it "solitary and shy in its habits, frequenting rivers, under the banks of which it conceals itself during the day." In Natal it is the characteristic duck of rocky streams

MAP 37. Distribution of African Black Duck (*Anas sparsa*)
Sporadic records indicated by crosses (×)

(J. H. Gurney, 1859; Finsch and Hartlaub, 1870; C. G. Davies, 1908). Farther north, in the Kilimandjaro region, it has been found at altitudes up to 4300 feet (Sjöstedt, 1910), and on the rivers of the Ruwenzori Range to 12,000 feet (Ogilvie-Grant, 1910). In British East Africa it may be found on any small swamp or river after the rains have begun, from October to January (Hinde, 1900). On the central Abyssinian plateau it was not found on the larger rivers that teemed with Yellow-bills and other ducks but on the streams (Ogilvie-Grant, 1900). Von Erlanger (1905) found them common on these mountain streams in pairs at altitudes of over 7900 feet; and several times he saw them at considerable distances from streams, on the alpine meadows, where cattle were grazing. Chapin (MS.) found it a very rare bird on the forest brooks of the Ituri River district (northeastern Congo).

When Mr. F. E. Blaauw (1917a) was in South Africa in the spring of 1914 he only once succeeded in seeing this duck. In following the course of a mountain stream in the Zwarte Bergen on his way to the Congo caves, he flushed a duck which probably had young ones. The bird flew a short distance only and then kept anxiously looking back.

Wariness. Though not always described as a wild bird, the African Black Duck it certainly shy, retiring and more or less nocturnal; and owing to its ability to skulk off into concealment its presence is often overlooked (Mouritz, 1915). In Abyssinia on the high mountain meadows it was so shy and cautious that it could not be approached within shot (von Erlanger, 1905).

Daily Movements. In the evening it flights just after sundown like most other ducks, returning by the same route at dawn (W. L. Sclater, 1912a).

Gait, Swimming, Diving, Flight. There is every indication that this species does not conform in its habits to those of the true surface-feeding ducks, for it is an excellent diver (von Heuglin, 1873). When it has moulted the flight-feathers, it is said to depend for its safety entirely on diving and hiding under the river-banks. At this it is very expert, and can with difficulty be scared from its concealment (Layard, 1875–84). Blaauw's (1917a) captive birds, which seemed to him more allied to the Gadwall than to the Mallardlike ducks, were very expert divers, almost rivalling the true diving ducks in this respect.

It is said to rise somewhat heavily when disturbed (Stark and Sclater, 1906) but to have a swift, straight flight when under way (W. L. Sclater, 1912a). According to von Heuglin (1873) the flight is hasty, noisy and whistling, but this evidently refers to their rising when flushed. The birds are almost always found in pairs, except for a time after the breeding season, when the young are still with the female (W. L. Sclater, 1912a). No observers have noted large flocks. Family parties follow the streams in close formation (von Heuglin, 1873).

Association with other Species. The kind of country it inhabits and its solitary nature make association with other species of ducks purely accidental.

Voice. There are no satisfactory published descriptions of the voice. Several observers have described it as a loud *quack* or as "resembling that of the Mallard" (Stark and Sclater, 1906; W. L. Sclater, 1912a). Blaauw (1917) has given a very different idea. Although he does not write about it in detail he says it is not at all like the voice of the typical Mallard-like ducks. He described it to me as a low sort of whistle (not at all like a Widgeon's) from the male, and an ordinary *quack* from the female. I never heard it but once myself and this was in the London Gardens in May. The female at that time was giving an occasional subdued or obscure *quack*. The male had a sort of wheezing note but I could not hear it very well among a lot of other water-fowl. On the whole, though, the notes were more Mallard-like than I had supposed that they would be.

Food. Von Heuglin (1873) observes that in Abyssinia these birds drop down on the barley-fields to seek worms or snails or to pick fresh grass-sprouts. Some of their food is obtained in shallow water and some by diving. T. Ayres (1880) found the whole œsophagus of some specimens crammed with grass seeds.

Courtship and Nesting. In South Africa the Black Duck breeds over a long period, from about August to December, but eggs have been found as late as February near King William's Town (Stark and Sclater, 1906), and in July near Pretoria (L. E. Taylor, 1906). On the Zambesi, Kirk (1864) found young in March. He says that the adults appear during the rains to breed, and leave at the end of April. In southern Rhodesia they have been noted breeding in June (Mouritz, 1915). A brood was found in January on Ruwenzori at an altitude of 10,000 feet (Ogilvie-Grant, 1910) and it undoubtedly breeds throughout the year in the tropical regions, though there are no data to corroborate this statement. At the northern extremity of its range, in Abyssinia, it nests in the spring. After spending the winter in the low country a few pairs break away in March and go to the pools and rush-overgrown hollows as well as to standing pools in the mountain streams (von Heuglin, 1873). Von Erlanger (1905) found birds about to breed early in February (altitude 2700 meters).

So few nests have been described that it is impossible to make a general statement as to the locality usually chosen. It would not be surprising if the birds were found to nest in hollows of decayed trees or in nests of other species. Mr. Bowker found a nest on the Caledon River, Basutoland, placed in a mass of drift in an overhanging willow tree, about fifteen feet from the ground and six feet from the water, in a hollow of the rotten wood under the wrack (Layard, 1875–84); and a nest was found in a somewhat similar position on the Buffalo River near King William's Town

(Stark and Sclater, 1906). At Irene, near Pretoria, a pair nested on an islet in the middle of a "dam," concealed among some rushes and built on the ground about two feet above the water.

The clutch is often small, but as many as eleven have been noted. According to Blaauw (1917) the eggs are rather large, elongated and of a pale-yellow color with much gloss. They measure 57 by 42.5 mm. (Layard, 1875–84). Blaauw hatched the eggs under a hen on the twenty-fifth day. The young are said to remain with the parents for some time after they are hatched (Woodwards, in Stark and Sclater, 1906), and it is probable that as with the Sheldrakes the pairs remain together throughout the year.

Status. The status of this duck has probably not changed materially since the days of the earlier explorers. Although well distributed it can hardly be called a plentiful species anywhere.

Enemies. Horsbrugh (1912) mentions the large monitor lizards (*Varanus*), which swarm on the rivers, as destroying many eggs and young of this and other species.

Food Value. A note by Atmore (in Layard, 1875–84) in which he describes the African Black Duck as "delicious eating," is the only direct information on this subject that I have found.

Hunt. Swynnerton (1908) says the natives snare them in Gazaland. Nothing else has been recorded.

Behavior in Captivity. Although the African Black Duck is apparently kept rather commonly in South African Gardens, and is said to be easily tamed and to bear captivity well (Stark and Sclater, 1906; Swynnerton, 1908; Sharpe, 1904), it does not appear to have been introduced into Europe until a very recent date. Blaauw (1917) has given a full and very interesting account of a pair which he brought back from Natal in 1914. In the spring of the following year the birds became very quarrelsome with the other ducks, so that he had to isolate them. They made no attempt to breed. Toward the end of April, 1916, the female began to lay in a small box placed among the reeds over the water. She laid six eggs, which were buried in an ample layer of down. The eggs were taken from her and given to a bantam hen which hatched them on the twenty-fifth day (May 29). The ducklings were very active from the first and fed on ant larvæ and any insects they could catch. They were all successfully reared. The old female continued to incubate the eggs of an Australian Black Duck (*Anas superciliosa*) that had been given her. Each time she left them in search of food the male kept her company as long as she was about.

A few days before the eggs hatched the male moulted his flight feathers and from that moment kept to himself, rejoining the female and her foster children only after the moult was completed. The birds dived and took food from the bottom of the water. An excellent plate showing the young feeding is annexed to Mr. Blaauw's article.

I saw a fine stock of these ducks at Mr. Blaauw's place in 1922, nearly all the increase from the original pair. They have been successfully kept in London for a number of years and a pair or two recently reached this country.

GEOGRAPHICAL RACES

THERE is a difference in the color of the bill between South African and East African examples, and this has resulted in the separation of a northern race. In the small series available for comparison this race appears to be valid. Two males and a female collected by J. P. Chapin in the Ituri Forest of the upper Congo have the bills "pinkish gray or brownish pink" according to a letter from Mr. Chapin, and presumably these belong to the same race as those from East Africa.

ANAS SPARSA SPARSA EYTON

CHARACTERS: Bill dark lead-blue with black saddle-mark and black nail, and a small yellow area at the base of culmen.

RANGE: South Africa; northern limits not defined.

ANAS SPARSA LEUCOSTIGMA RÜPPELL

Anas leucostigma Rüppell, Systematische Uebersicht d. Vögel Nord-Ost-Afrikas, pp. 130, 138, pl. 48, 1845.

CHARACTERS: Bill yellow with black saddle-mark. Congo Forest specimens said to have the bills "pinkish gray" or "brownish pink" (Chapin, *in litt.*).

RANGE: East and northeast Africa, across to the upper Congo and the Cameroun; rare in the western parts of its range.

MELLER'S DUCK

ANAS MELLERI SCLATER

(Plate 25)

SYNONYMY

Anas xanthorhyncha Roch and E. Newton (*nec* Forster), Ibis, ser. 1, vol. 5, p. 174, 1863.

Dafila erythrorhyncha P. L. Sclater (*nec* Gmelin), Proc. Zool. Soc. London, 1863, p. 165.

Anas melleri P. L. Sclater, Proc. Zool. Soc. London, 1864, p. 487, pl. 34.

Anas moreli Grandidier, Rev. et Mag. de Zool., ser. 2, vol. 19, pp. 88, 255, 1867.

Anas mascarina Vinson, Mém. Soc. Acclimat. de l'Ile Réunion, 1868, p. 5.

VERNACULAR NAMES

English: Meller's Duck.

Madagascan: Angaka, Akaka, Akakamainty, Harki.

DESCRIPTION

ADULT MALE: General color reddish; the feathers brown in the middle and margined with reddish; head and neck with narrow dusky streaks, each feather margined with reddish; feathers of the back with some narrow irregular reddish bars; speculum glossy green, bounded anteriorly and posteriorly by two velvety-black bands, the anterior one at the tip of the greater wing-coverts; a narrow whitish band at the tip of the secondaries; before the anterior black band there is also a narrow dull-reddish band; tertials velvety brown, darker on the outer web; under wing-coverts and axillars white (Salvadori, 1895).

"Bill black (?); irides sienna-brown; feet fleshy color" (Sclater, *fide* Salvadori, 1895).

Wing 240–260 mm.; culmen 58; tarsus 38–45.

ADULT FEMALE: Similar to the male.

YOUNG: Has a redder tinge, almost rusty, on the edges of the feathers of the lower parts (Salvadori).

DISTRIBUTION

ALTHOUGH it has been introduced on Mauritius the present species originally was found in Madagascar only. It appears to be quite common there, especially in the interior (Milne-Edwards and Grandidier, 1876–81). Still, specimens have been taken on all coasts: on the east at Tamatave (Roch and Newton, 1863), on the northwest at Bombetok Bay, and on the southwest at Tulear (Milne-Edwards and Grandidier, 1876–81). It is common at Lake Alaotra in the northern interior (F. R. Wulsin specimens). On Mauritius the species was introduced about 1850, and though Sclater (*fide* Hartlaub, 1877) states that it breeds abundantly there at Mare aux Vacoas, Captain Meinertzhagen (1912) has recently reported that on the whole, it had increased only very slowly in the sixty years preceding 1910.

GENERAL HABITS

LITTLE is known of this bird beyond what is summarized by Milne-Edwards and Grandidier (1876–81). They speak of the duck as inhabiting chiefly the swamps and morasses of the interior of Madagascar, where it finds the aquatic animals and young shoots or grain on which it feeds. On the coasts it appears to be more rare in spite of the numerous lagoons and water courses. The eggs are yellowish in color, measuring 42 by 59 mm. The native names Angaka and Akaka are said to be onomatopoetic.

Eggs in the British Museum are of a rich cream-color, blunt and oval in form and smooth, with a fair amount of gloss (E. W. Oates, 1902).

Mr. F. R. Wulsin, collecting for the Museum of Comparative Zoölogy, in 1915, secured nine specimens with the help of native boys at the southeast end of Lake Alaotra and on the Gahabe River in the same general region. The country there, so Mr. Wulsin tells me, was very swampy with enormous quantities of rushes. The low ground was thoroughly water-soaked and partially flooded; not a shallow lake free of vegetation. His boys got nine in two and a half days, shooting the ducks sitting so they could not have been very wild. He also thinks that this species cannot be persecuted overmuch at present for there are not a great many native hunters in Madagascar. The few ducks that are taken are probably shot from or near the shore and not from boats.

BEHAVIOR IN CAPTIVITY. A specimen of this rare species was presented to the London Zoological Gardens by W. H. Sharland in 1894 (Hubbard, 1907). It mated with a Mallard and the hybrids produced in 1904 proved fertile when mated with other complex hybrids containing strains of Mallard, Spot-bill, Australian and Pintail (Bonhote, 1907).

BRONZE-WINGED DUCK

ANAS SPECULARIS KING

(Plate 26)

SYNONYMY

Anas specularis King, Zoölogical Journ., vol. 4, p. 98, 1828.

Anas chalcoptera Kittlitz, Mém. Acad. Imp. Sci. St. Pétersbourg, vol. 2, p. 471, 1835.

VERNACULAR NAMES

English: White-faced Duck, White-marked Duck, Bronze-winged Teal or Duck.

Spanish: Pato anteojillo, Pato de las cordilleras, Pato perro, Pato del rio, Pato del estero.

DESCRIPTION

ADULT MALE: Head and neck dark brown, with a large patch between the eye and the bill white, and another large patch on the sides of the neck extending forward along throat and chin. This face-pattern shows considerable variation. Mantle dark brown, with lighter edges to the feathers; scapulars nearly black; whole under surface very similar to that of *Anas cristata* but the flank feathers differ in having large black spots. Lesser wing-coverts purplish black; a speculum, formed by nearly the whole length of the secondaries, bronzy green to copper color, bordered posteriorly by a black and a white band; primaries dark brown. Tertials purple-black; back, rump, upper tail-coverts and tail dark brown; under tail-coverts darker than abdomen.

Iris black. Bill slate, almost plumbeous. Legs and feet orange; claws black at tips, webs blackish (Lane, 1897).

Wing 267 mm.; bill 46; tarsus 45.

FEMALE: Similar to the male but duller (Salvadori, 1895).

YOUNG IN DOWN: Upper parts brown; under parts, sides of the head, a band on the posterior edge of the wing joining another on the sides of the back, and a spot on each side of the rump whitish; a brown band from the eye to the occiput, and a second one across the cheeks (Salvadori). This appears to be typical for the genus, but without a specimen it is not easy to judge.

DISTRIBUTION

THE known range of this duck has recently been considerably extended. It is primarily an Andean bird, resident in the central and southern parts of that chain. Schlegel (1866) lists a specimen in the Leyden Museum said to have been collected by D'Orbigny in Bolivia. In Chile the northernmost record seems to be that for Colchagua (L. Fraser, 1843). There are two specimens from Temuco, Chile, in the British Museum, taken in April, 1910, and this must be near the northern limit of the range. Philippi (1868) gives Valdivia as the northern limit of its regular range and speaks of it as a rare bird in central Chile. Mr. Blaauw writes me that he saw it in 1911 on the edge of a stream that flowed into Lago Todos los Santos in central Chile. Lane (1897) has reported it from Rio Bueno and

Rio Pilmaiguen, in the Andes south of Valdivia. The species was originally described from a specimen taken by King (1828) in the Straits of Magellan. Since then Schalow (1898) has recorded it for Punta Arenas. There is no evidence of its presence on Tierra del Fuego.

Until recently this duck has not been known to occur east of the Andes, though it is most common on the mountain streams of that range. C. V. Burmeister (1888) first recorded it for the Andean region of central Patagonia, without mentioning any specific locality. Since then it has been found on Lago General Paz (extreme western Chubut) by Gerling (Dabbene, 1910) and on the Carrenlewfu River in western Chubut (Lynch Arribálzaga, 1902a). There are several specimens in the British Museum from Valle del Lago Blanco in Chubut. The Princeton Expedition to Patagonia apparently took no specimens but it is stated in the report (Scott and Sharpe, 1912) that the species may be found in central and southern Patagonia from the Rio Negro to the Straits. The La Plata Museum is said to have specimens from South Patagonia (Dabbene, 1914; Scott and Sharpe, 1912). Mr. Stuart Shipton of Concepcion, Tucuman, commander of H. M. S. *Southampton*, told Mr. J. L. Peters that he was having prepared for his collection five specimens he had shot on the coast of Patagonia. It must, however, be a very rare bird east of the Andean watershed lakes, judging by the few records and from what is known of its habits. Mr. Dabbene writes me (March, 1920) that "large flocks can be seen in the lake regions of southwest Argentina from Lago Nahuel Huapi (western Rio Negro Province) toward the south." The Museum of the University of California possesses two specimens taken at Barriloche, Nahuel Huapi, in March, 1912, and Mr. J. L. Peters, collecting for me, obtained a pair at Huanuluan on the upper Rio Negro (elevation 3100 feet). He tells me that the species was unknown to the natives of that district and that the birds must have been stragglers. I suspect that this is a rather local species and one rather closely confined to the lakes and streams of the eastern Andes.

GENERAL HABITS

Nothing is known of the life-history of this rare bird beyond the fact that it is of a rather solitary nature, occurring usually in pairs, on rivers shaded by forests (L. Fraser, 1843) and very rarely in open marshy country frequented by other waterfowl. I think Dr. Dabbene must have been misinformed in writing me that large flocks may be found in the lake regions of southern Argentina (south of Lake Nahuel Huapi), though it may be that the birds come out of the woods to the lakes at certain seasons. Mr. Peters, who was at Lake Nahuel Huapi in the spring of 1921, on February 12, flushed four from a moist grassy spot in the delta of the Rio Niriguao. They flew over the beach and alighted on the lake.

Lane (1897) always found the species near the banks of the rivers shaded by forests and never in fields or open marshes. He says that on these mountain streams it was the only species of duck which occurred. Nothing is known of the nesting habits of these birds, but the eggs are described as 57–62 mm. by 39–40 mm. in diameter (Schalow, 1898).

Mr. Peters says the note is a low hoarse *quack* which presumably refers to the female.

The trachea is 195 mm. long and bears in the male sex a left-sided, smooth, spherical bony box of moderate size. In length this structure is 16 mm. and in breadth 14 mm.

The first and apparently only specimen imported into Europe was received by the

MAP 38. Distribution of Bronze-winged Duck (*Anas specularis*)
Sporadic records indicated by crosses (×)

London Zoological Society in 1881 (P. L. Sclater, 1881) and seems to have lived but eleven months (P. C. Mitchell, 1911). Mr. F. E. Blaauw saw two specimens in confinement in a garden in Concepcion, Chile.

The stomachs of the two which came in the Peters collection from Huanuluan in Rio Negro were kindly examined by the U.S. Biological Survey and the results are as follows. Both were from birds shot in mid-spring (October 20). In the first the percentage of animal matter was 10%, vegetable 90%, besides the usual gravel, etc. There were ground-up foliage and a few seeds of water-crowfoot (*Batrachium*), 88%; a few seeds of water-milfoil (*Myriophyllum*) and a rush (*Scirpus americanus*), 2%; remains of caddis larvæ and Corixidæ, 10%. The second stomach, which was also full, contained animal matter, 60%, vegetable 40% as follows. One seed of *Potamogeton* and foliage of the plant, 31%; numerous seeds of *Myriophyllum*, 5%; 14 of *Scirpus americanus*, 1 of *Batrachium* and 1 unidentified, 4%. There were fragments of caddis larvæ and cases and traces of other insects, 60%.

CRESTED DUCK

ANAS CRISTATA GMELIN

(Plate 26)

SYNONYMY

Anas cristata Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 2, p. 540, 1789.
Tadorna cristata Stephens, General Zoology, vol. 12, pt. 2, p. 77, 1824.
Anas specularioides King, Zoölogical Journ., vol. 4, p. 98, 1828.
Anas pyrrhogastra Meyen, Nova Acta Acad. Leop.-Carol., Halle, vol. 16, suppl., p. 119, 1833.
Dafila pyrogaster Eyton, Monograph Anatidæ, p. 113, 1838.
Anas tophyra Forster, Descriptiones Animalium, p. 340, 1844.
Dafila pyrrhogastra Reichenbach, Synopsis Avium, Natatores, pl. 88, fig. 923, 1845.
Dafila cristata Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.
Lophonetta cristata Riley, Proc. Biol. Soc. Washington, vol. 27, p. 100, 1914.

VERNACULAR NAMES

English: Crested Duck, Antarctic Duck, Gray Duck.
French: Milouin des Malouines.
Spanish: Pato juyal, Pato juarjual, Pato crestado.

DESCRIPTION

ADULT MALE: Top of head dark gray, forehead, sides of head, and neck very light gray, dotted with blackish, the dots, however, being absent on chin and throat, which areas are almost pure white. A long occipital crest of gray feathers extends back along upper side of neck. All the lower parts pale fulvous to a rusty-brown color, with the breast, and sometimes the abdomen more or less spotted, or irregularly barred with darker tints. Mantle and scapulars brown, the feathers having grayish margins on the former region and dark tips on the latter region. Wing with a very beautiful coppery-red to metallic-green speculum, bounded posteriorly by a wide black, followed by a wide white band. Lesser wing-coverts uniform gray-brown. Under wing-coverts dark gray, axillars white. Primaries dark olive-brown. Rump and upper tail-coverts light gray, tail black, with metallic reflections. Under tail-coverts black.

Iris reddish to brownish. Bill black above, flesh-color below. Legs and feet grayish (R. M. Beck, field notes).

Wing 250–264 mm.; bill 39–44; tarsus 46–50.

Weight 2⅝ to 2⅝ pounds (1.07 to 1.18 kilograms).

ADULT FEMALE: Similar except for a shorter crest and smaller size. Colors of soft parts same.

Wing 240–247 mm.; bill 39–42; tarsus 44–48.

Weight about 0.5 pounds (0.22 kilograms) less than male.

CRESTED DUCK

BRONZE-WINGED DUCK

YOUNG IN FIRST PLUMAGE: Very similar to adults, but lower abdomen much paler, the head without a crest, and tail shorter and more square, with the tips of the feathers blunt.

YOUNG IN DOWN: Differ from the Mallard in having no striping on the face, with the brown of the crown and face merging gradually into the pure white of chin and throat. Whole upper side delicate gray-brown; under side immaculate, except for buffy stain on breast. White patches occur, as in the young of most ducks, on wings, scapulars, sides, and rump.

Note: As Salvadori remarks, this is not a typical member of the genus *Anas*, the long pointed tail, crest and peculiar downy young suggesting other relationships.

DISTRIBUTION

THIS duck is a common species in western and southern South America, frequenting particularly the high Andes. Many observers have believed it migratory, but a survey of the available dates soon shows that the birds are met with in both extremes of the range at the very same seasons, and the evidence also indicates that they breed throughout the area of occurrence. There is, however, good reason to suppose that they migrate vertically, and several investigators have pointed out that the birds are found at very high altitudes in the warm season, while during the cold months they frequent the lowlands and coast regions.

The northernmost record for this duck seems to be that given by Taczanowski (1886) for Lake Junin and Salinas, Peru, altitude 14,000 feet. Whitely (P. L. Sclater and Salvin, 1876) who took specimens there, also met with the species at Tinta. It has been found also in Arequipa, southern Peru (Oustalet, 1891), at an altitude of 4000 meters. There is now sufficient evidence of its presence in the mountainous areas in western Bolivia. It was found there at Tamarope and Cosapilla, 4200 meters, and at Lake Poopo (Menegaux, 1909a). Eggs also have been taken in the Bolivian Andes (Scott and Sharpe, 1912).

Peru
Bolivia

In Chile the species is apparently common. It is so recorded from Tarapaca (Lane, 1897; Philippi, 1888). Farther south it has nested at Huasco and Sacaya (Lane, 1897) and it is known also from Santiago Province (Leybold, 1873). Many observers have recorded it for Chile in general (Philippi, 1868; James, 1892; Quijada, 1910; etc.) and Coppinger (1883, p. 68) states that it is quite common in the south at Trinidad Channel.

Chile

The Crested Duck is perhaps less common in the Argentine, excepting the Andean regions, but even so it has a wide distribution in that Republic. It has been found as far north as Jujuy and Salta Provinces at high altitudes (Bruch, 1904) and has been recorded for Tucuman from the Laguna de Cerro Pelado, 5000 meters (!) (Baer, 1904), for Tucuman City (Hartert and Venturi, 1909), for Lago Grande, 4300 meters (Hartert and Venturi, 1909) and from the whole Province, 4500 meters (Lillo, 1902). Eggs were taken at Lago Grande, 4300 meters (Hartert and Venturi, 1909). The Princeton Patagonian Expedition (Scott and Sharpe, 1912) took specimens at Mt. Tigre, San Juan Province, and P. Gosse (1899) and Reed (1916) met with it in the Cordilleras of Mendoza. There is no evidence, however, of its occurrence in the lower eastern sections, in Gran Chaco or the districts west of the La Plata. But farther south in Patagonia it has been frequently seen. It is found at all seasons in eastern Patagonia (Oustalet, 1891) and has been recorded for Bahia (Dabbene, 1910). Farther west it breeds in Neuquen and also on Lago Nahuel Huapi in western Rio Negro (Venturi, *fide* Dabbene, 1910). Mr. J. L. Peters, collecting for me, thought it a not uncommon migrant in western Patagonia. The Princeton Expedition (Scott and Sharpe, 1912) found it in Chubut, and Oustalet (1891) states that it is met with in winter in southern Patagonia.

Argentina

On the Straits of Magellan this duck is quite common (Cunningham, 1871) and has been recorded

from a great number of localities, of which those for Gregory Bay, Punta Arenas and Rio Pescado

Straits of Magellan

(Salvadori, 1900a) as well as Port Rosario, Cockle Cove, Tom Bay (Sharpe, 1881) and Elizabeth Island (Ridgway, 1890) are sufficiently representative. Some of these records are for the warm and some for the cold season, indicating that even so far south the species is

Tierra del Fuego

essentially resident. The same is true of Tierra del Fuego (Crawshay, 1907) where it is also quite common (Blaauw, 1916a; Dabbene, 1910, etc.). Mr. Rollo M. Beck brought together a very large series of these birds from southern Chile and Tierra del Fuego in 1914 for the Brewster-Sanford collection, now in the American Museum of Natural History in New York.

The Crested Duck is common also on both of the large islands and presumably on the smaller

Falkland Islands

islands of the Falkland group (Abbott, 1861). Mr. W. S. Brooks, who visited these islands recently, found it still abundant and breeding there, much as it does in Tierra del Fuego.

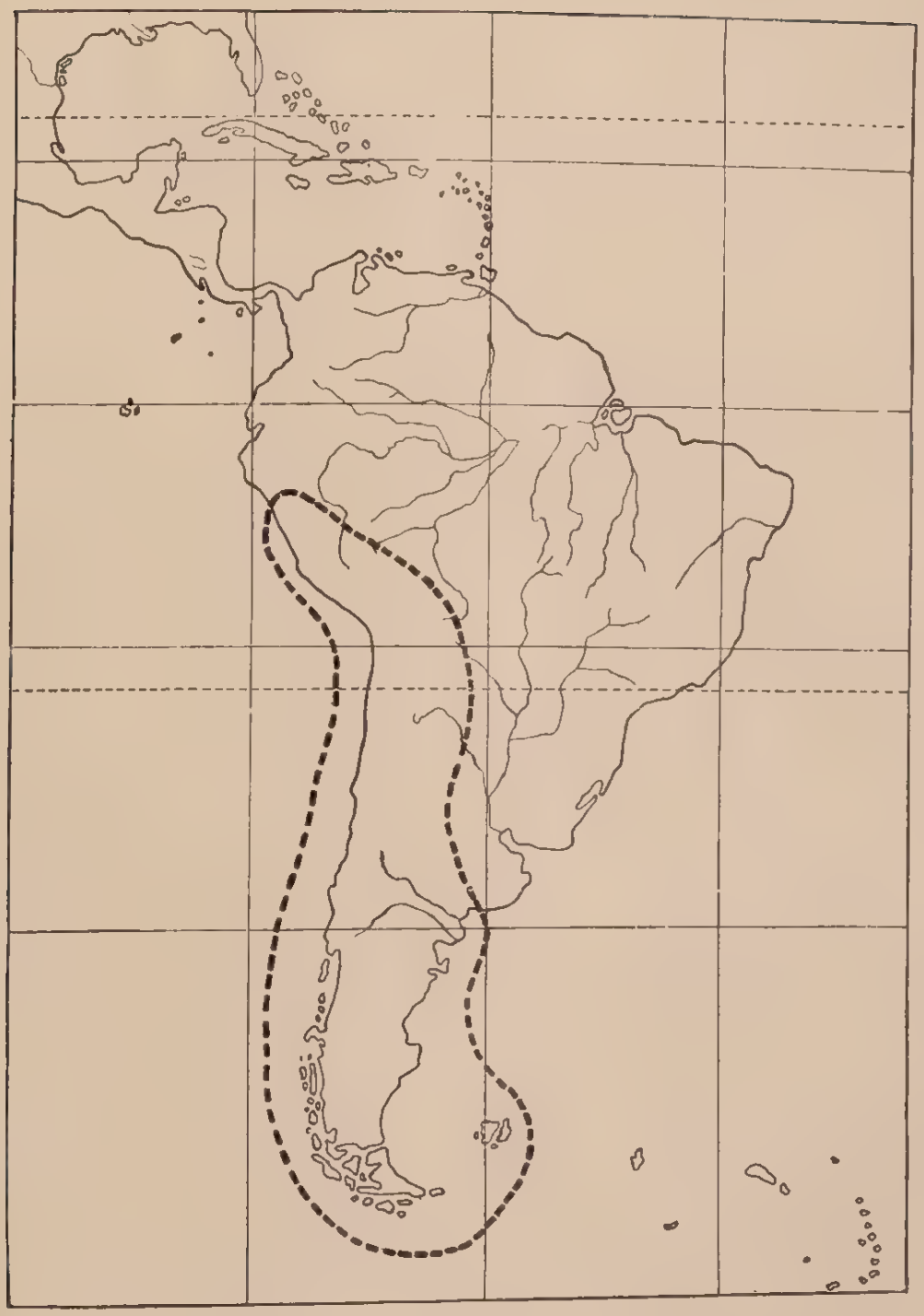
GENERAL HABITS

HAUNTS. This is the characteristic duck of the coasts of antarctic South America. Although in most regions it retires into the interior to breed, it is found during the greater part of the year on the salt water and even on kelp beds a considerable distance from shore. At the northern extremity of its range, on the high mountain lakes of Bolivia and Peru, it is resident the year round and has become differentiated as a local race (*Anas cristata alticola*). In the rigorous climate of Tierra del Fuego it is the only duck, excepting the Steamer Duck (*Tachyeres cinereus*) which braves the antarctic winter. So far as known there is no migration even from this extreme southern limit of its range. What migration there is seems to be vertical, and P. Gosse (1899) speaks of seeing some on a small lake in the Horcones Valley, Mt. Aconcagua, which they seemed to use as a halting station, since they never stopped for more than a day or two. It is doubtful whether this duck is very closely related to the more typical surface-feeding ducks of the northern hemisphere. Riley (1914) has even proposed a separate genus for it.

WARINESS. The Crested Duck is considered more wary than the Chiloë Widgeon (*Anas sibilatrix*) or the Chilian Pintail (*Anas spinicauda*), according to Crawshay (1907), but Blaauw (1916a) found them quite tame in a sanctuary at Porvenor Bay, Chile. Mr. J. L. Peters found it by no means wild in western Patagonia, and he succeeded in enticing a pair to within gunshot by waving his hat at them.

DAILY MOVEMENTS. This duck is probably crepuscular in its habits. In southern Peru, about Lake Junin, it is seen on land more frequently than some of the other ducks; like the Brown Pintail it leaves the water in the evening and spends the night on the prairies. In the daytime it is found on the lake shore, just outside the belt of reeds (Taczanowski, 1886).

GAIT, SWIMMING, DIVING, FLIGHT. After reading the voluminous field notes of



MAP 39. Distribution of Crested Duck (*Anas cristata*)

Mr. R. M. Beck I carried away the impression that these birds seldom if ever travel in large flocks, for only pairs or family parties were met with in the Straits of Magellan and the Tierra del Fuego region. Mr. Peters says he never saw more than two together in the Rio Negro Province of Argentina.

Association with other Species. These ducks are of a very jealous nature and pairs do not associate even with their own kind (J. L. Peters, MS.). Captain Abbott (1861) speaking of the Falkland Islands, says the pairs have "certain boundaries of water" along the coast, upon which they will not allow others of their species to encroach.

Voice. The notes of this duck have not been adequately described. Crawshay (1907) speaks of a curiously harsh *quack*, resembling that of a land rail. On the whole it is a silent bird, and the only note heard (probably that of the female) was a high-pitched feeble *quack* (J. L. Peters, MS.).

The trachea of the male is 180 mm. long and at the lower end is a left-sided *bulla ossea* very similar to that of *Anas specularis*. It is 22 mm. long and 15 mm. broad, and roughly spherical in shape.

Food. The diet probably consists chiefly of marine animals throughout the greater part of the year. Abbott (1861) noted their feeding on shell-fish in the Falklands, and in the Straits of Magellan Cunningham (1871) saw them on the kelp beds some distance from shore. In Tierra del Fuego (Phillips Bay), Mr. Blaauw (1916a) found them especially numerous and feeding with gulls, skuas and oyster-catchers on the refuse from a sheep-refining plant.

Mr. J. L. Peters brought back two stomachs from Huanuluan, Rio Negro, taken September 25, 1920, and they contained from 88 to 95% of animal matter. This consisted of ground-up small crustaceans, and there were also a few seeds of *Myriophyllum*, *Carex*, bits of grass-root and stem and the trace of a weevil.

Two more collected by Lord William Percy at Lake Junin, Peru, in April, 1920, contained mostly vegetable matter, representing both *Naias* and *Potamogeton*.

Courtship and Nesting. The breeding season in Patagonia, southern Chile and the Falklands is well defined, extending from early October into November. Exceptionally late dates were noted by R. M. Beck (MS.) who found a nest and two eggs on Bleeker Island on December 13, and on London Island came across young just able to fly on January 18. In the Falklands, W. S. Brooks (1917) found the first brood of downy young on November 19 and the last on February 8. He considers the latter date extremely late. Farther north in Tucuman a nest and eggs were found at an altitude of 4300 meters in early February (Hartert and Venturi, 1909),

and in Tarapaca (northern Chile) it is said to nest from January to March (Lane, 1897). Eggs have been taken in the Bolivian Andes in late January (E. W. Oates, 1902).

In western Patagonia Mr. J. L. Peters found them apparently paired in late August and most certainly so by the middle of September.

Nothing is known of the display of the male or of the relations of the sexes during and after incubation. The nest is made on the ground, thickly supplied with down. In Tarapaca they are said to prefer little islands in ponds and to build in the sedges and rushes (Lane, 1897). In the Straits of Magellan and on the Falklands many seem to nest near the coast and bring the young to the salt water soon after hatching. The clutch is small, consisting of only five or six eggs, which are of a regular oval form, rarely elliptical, slightly glossy and cream-colored (E. W. Oates, 1902), measuring about 44 by 62 mm. The incubation period is not known.

STATUS. There is no reason to think that recent years have brought any marked changes in the numbers of this duck.

ENEMIES. In antarctic regions the Skua Gulls are very destructive to many species, including no doubt this one. R. M. Beck (MS.) tells of photographing a nest of this species on Bleeker Island, and says that while he was standing only twenty feet away a Skua flew down and carried away an egg.

FOOD VALUE. Its marine habits no doubt make this duck rather inferior eating but in the Andes, Lane (1897) found it good. Mr. J. L. Peters thus describes the meat of specimens taken in western Patagonia: "I cannot recommend this species very highly as a table duck. The flesh is dark and coarse and very ordinary in taste."

BEHAVIOR IN CAPTIVITY. Eyton (1838) speaks of this bird as having been represented in Lord Derby's collection at Knowsley. The London Zoological Gardens did not exhibit it until 1887 (Proc. Zool. Soc. London, 1887, p. 396) at which time two specimens were imported from the Falklands, presented by Frederick E. Cobb. One of these lived nine years and four months and the other two years and nine months (P. C. Mitchell, 1911). I do not know that it has ever been represented in any of our American zoölogical gardens.

GEOGRAPHICAL RACES

ANAS CRISTATA CRISTATA GMELIN

CHARACTERS: Size smaller, wing always under 280 mm. Lower side more or less mottled; chin and throat white.

RANGE: All of southern South America, except the mountain-plateau, to Straits of Magellan and Falkland Islands.

ANAS CRISTATA ALTICOLA MENEGAUX

Anas cristata alticola Menegaux, Bull. Soc. Philom., Paris, ser. 10, vol. 1, p. 224, 1909.
Lophonetta cristata alticola Riley, Proc. Biol. Soc. Washington, vol. 27, p. 100, 1914.

CHARACTERS: Size larger, wing in adult males over 280 mm., and usually from 290–300 mm. (302 in one case). The lower parts more uniform, slightly more washed out in appearance, and having the breast spots almost absent. The gray of the forehead extends a little higher toward the crown. Chin and throat slightly more buffy.

RANGE: Bolivia and Peru at high altitudes.

GADWALL

ANAS STREPERA LINNÉ

(Plate 27; Plate 32)

SYNONYMY

Anas strepera Linné, Systema Naturæ, ed. 10, vol. 1, p. 125, 1758.
Anas cinerea S. G. Gmelin, Reise Russland, vol. 2, p. 184, pl. 17, 1774.
Anas kekuschka S. G. Gmelin, Reise Russland, vol. 3, p. 249, pls. 26, 27, 1774.
Chauliodus strepera Swainson, Journ. Roy. Inst. Gt. Britain, vol. 2, p. 19, 1831.
Chauliodes strepera Gould, Birds of Europe, vol. 5, pl. 366, 1837.
Chaulelasmus streperus Bonaparte, Comparative List, p. 56, 1838.
Ktinorhynchus streperus Eyton, Monograph Anatidæ, p. 137, 1838.
Querquedula strepera MacGillivray, Manual Ornith., vol. 2, p. 169, 1842.
Anas mail Hodgson, Gray's Zool. Miscellany, p. 81, no. 500, 1844.
Chaulelasmus strepera Reichenbach, Synopsis Avium, Natatores, pl. 92, fig. 165–167, 1845.
Chaulelasmus cinereus Brehm, Vogelfang, p. 373, 1855.
Chaulelasmus americanus Gray (*?ubi*), *fide* Brehm, Vogelfang, p. 374, 1855.

VERNACULAR NAMES

English: Gadwall, Gray Duck, German Duck, Speckle-belly, Creek Duck, Blaten Duck, Welsh Duck, Gray Widgeon, Sand Widgeon, Gad-bill.
French: Canard chipeau, Canard ridenne, Canard bruyant, Canard strepère, Bourriquet, Pilet tierce, Double sarcelle, Violon (Louisiana Creoles).
German: Schnatterente, Scharrente, Lärmente, Nesselente, Weissspiegel, Scherrentlin, Doppelkricke, Kleine Stockente, Polnische Ente.
Danish: Knarand, Graesand, Perleand.
Norwegian: Snadderand.
Swedish: Snatterand, Middeland.
Icelandic: Litla gräond.
Finnish: Lörppösorsa.
Dutch: Krakeend, Krust, Halve Eendvogel, Roepereend.
Spanish: Anade ridente, Pato pinto, Pato castellano, Ascle, Griset.
Basque: Ata ostuna.
Portuguese: Frisada.

GADWALL

COUES'S GADWALL

Italian: Canapiglia, Ridenna, Aneda saelvadega, Albera, Pignolo, Anitra montanara, Ervalora, Trigali.

Maltese: Culuvert second.

Croatian: Patka kreketaljka.

Czech: Kaprivka.

Polish: Kaczka cyranka.

Russian: Serucha, Kraikovaia-utka, Polucha.

Tartar: Kur-urdak.

Bashkirs: Kugal.

Hungarian: Kendermagos recze.

Mongolian: Shiraegoi.

Japanese: Okayoshigamo.

Hindu: Mila, Bhuar, Beykhur.

Bengali: Peing-hans.

Nepalese: Mail.

Sindhi: Burd.

Mexican: Colcanauhtli.

DESCRIPTION

Adult Male: Top of head ruddy brown, mixed with indistinct blackish. Sides of head whitish, thickly speckled with blackish and having a nearly obsolete post-orbital stripe of brown. Neck nearly like cheeks; mantle and scapulars nearly black, highly ornamented with narrow wavy lines of white or buff. Tertials rusty brown to grayish. Back dark gray; rump and upper tail-coverts iridescent green-black. Breast black with narrow crescentic white bars merging into whitish and with black bars as it shades off into the white of abdomen. Flanks vermiculated, dark gray and white, lower abdomen more or less grayish, under tail-coverts deep green-black. Lesser wing-coverts brownish, the median ones bright chestnut, forming a conspicuous patch, and the greater ones forming a black bar anterior to the speculum. Speculum formed by secondaries, which are black externally and white internally. Primaries brown; under wing-coverts and axillars white. Tertials long and pointed and light gray in color. Tail grayish brown.

Iris dark brown. Bill, culmen black except along cutting edge, where it is dull orange; lower maxillary dull orange on lower side. Legs and feet orange, webs dusky.

Wing 259–278 mm.; bill 40–44; tarsus 40–43.

Weight 2 pounds to 2 pounds 6 ounces (0.90 to 1.07 kilograms).

Note: Old World specimens are the same size as American ones.

Adult Female: General appearance somewhat like that of female Mallard, particularly head and upper side, but in adult plumage always whiter on abdomen, and having a large white wing-patch on the secondaries. The wing is the same as in the male, except that the chestnut patch is reduced to the tips of a few of the median wing-coverts.

Iris dark brown. Bill with a dark area down middle of culmen and light orange on the sides. Legs and feet yellow orange, paler than in the male.

Wing 240–248 mm.; bill 37–42; tarsus 38–41.

At breeding time the adult female becomes very much darker on the upper side, owing to the wear of the light feather-edges. Lord Percy writes me that this is always so, and that the majority are distinctly more heavily spotted underneath.

Young Female in First (Juvenal) Plumage: Resembles adult female, but is thickly spotted all over lower side. The white of the speculum is gray and there is no black patch on the greater coverts. The color of the mantle and scapulars is very close to that of the adult plumage, but the mantle is more uniform and the feathers usually lack the light bars of the adult bird.

Young Male in First Plumage: Very closely resembles female at a similar stage of development but can probably always be told by the light bars which occur on the feathers of the mantle. These feathers are nearly uniform in the young female and have no bars.

Young Male beginning to assume Adult Plumage: A few of the black and white feathers appear upon the upper breast and the lower abdomen begins to lose the spots. Upper side with a few adult mantle feathers showing, the chestnut patch appearing, and the speculum nearly like that of adult. Flank feathers more or less vermiculated. Long tertials not developed. Rump and upper tail-coverts still brown. Adult plumage not complete till spring.

Male in Eclipse Plumage: The resemblance to the female is very close but the wing remains as in the winter plumage.

Downy Young: Very closely resembles Mallard, and not easily distinguished from it. The streak through the eye is, however, much less pronounced, and the stripe down the back of the neck is narrower and lighter in color. In a specimen in the Museum of Comparative Zoölogy about ten days old, the bill is described as dusky brownish on upper mandible and bright ochraceous yellow on the lower. The feet are dusky vinaceous, and the webs are black. Lord Percy writes me that in his series, the downy Mallards are distinctly greener all over than Gadwalls, and have the thigh spots greener. Mr. A. C. Bent says that Gadwalls are always paler in down color than Mallards.

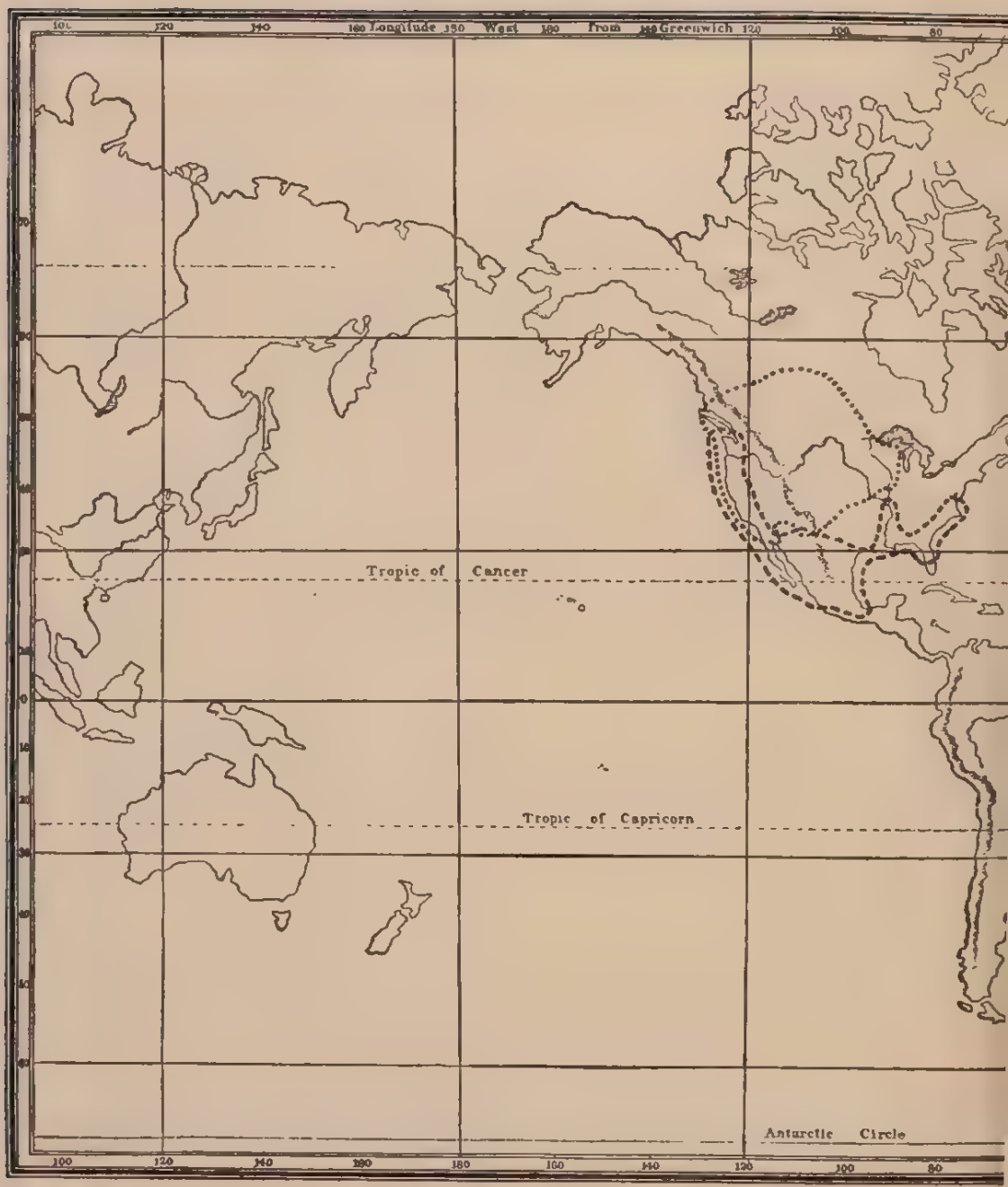
DISTRIBUTION

Breeding Range

The range of the Gadwall is similar to that of the Shoveller but extends neither so far north nor so far south. Its main breeding range lies between 30° and 60° north latitude, though it nests princi-

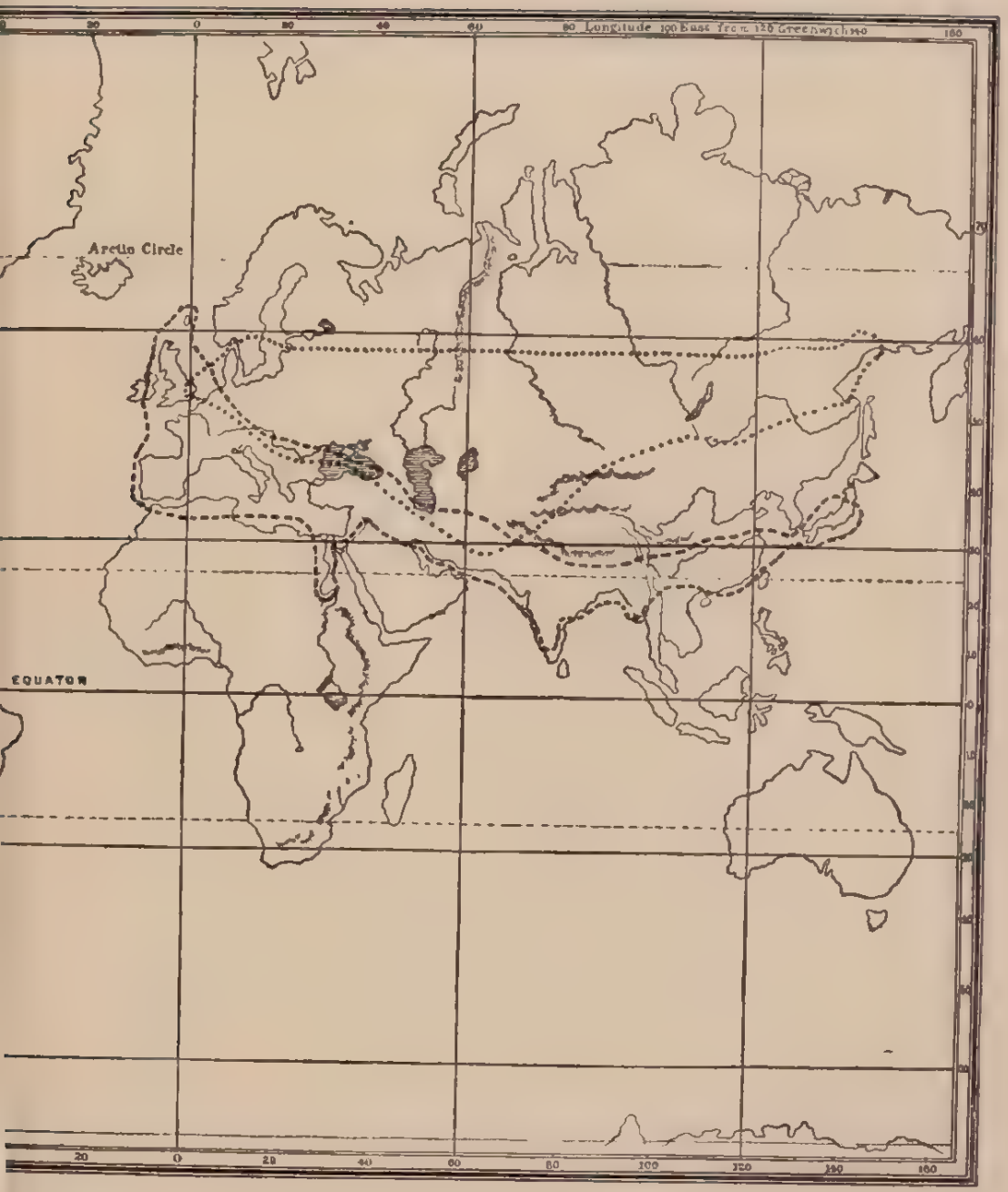
North America

pally between 40° and 50° north latitude. In America its range is not nearly so extensive as that of the Shoveller, for apparently it does not breed south of about 37° or 38° north latitude, or north of about 57° north latitude except in unusual cases. Longitudinally it breeds from the Pacific coast eastward regularly to Lake Michigan. From the western shore of Lake Michigan and the northern peninsula of Michigan the breeding limit runs northwest to the western shore of Lake Winnipeg, thence northward and westward through Athabasca south of about 57°, and west to Lesser Slave Lake; thence southwestward through central British Columbia, to the Pacific coast, which it follows south almost to Los Angeles. Here it bends inland, deflecting slightly to the south to include northern Arizona and New Mexico, whence it runs northeastward through Kansas and Iowa to Lake Michigan. Retracing this area we find it recorded for various districts as follows: formerly breeding in Wisconsin near Lake Koshkonong (Cooke, 1906) and still breeding in some sections (Cory, 1909). For Manitoba it has been variously reported nesting by Dippie (*fide* J. and



MAP 40. Distributi

Breeding range, dott



ll (*Anas strepera*)
·ange, broken line

J. M. Macoun, 1909), for Shoal Lake (Taverner, 1919), for Lake Manitoba and Buffalo Lake (Raine, 1892) and for Lake Winnipeg. E. E. Thompson (1891) has also recorded it for this Province. J. and J. M. Macoun (1909) give various breeding records for southern Saskatchewan. Bent (1907) has also recorded it as an abundant nesting bird in the southwest of Saskatchewan and Ferry (1910) for Prince Albert and Quill Lakes. From Alberta it has been recorded by Spreadborough (*fide* J. and J. M. Macoun, 1909) (Lesser Slave Lake and Peace River Landing) and by Horsbrugh (1915) for Buffalo Lake. Spreadborough (*fide* J. and J. M. Macoun, 1909) also says it is common as a breeder at Edmonton and so does William Rowan (*in litt.*) but according to Soper (1918) it breeds there only in limited numbers. Mr. Harper, collecting for me in 1920, saw none in the Athabasca Delta, but learned of five having been shot at Lac la Biche in April. In British Columbia it is found sparingly in the southern district, Victoria, Chilliwack and Okanagan (A. Brooks, 1917). It breeds throughout the northwestern United States, in Minnesota (Roberts, 1919), in North Dakota (Bent, 1901–02, U.S. Biological Survey), in Montana (Coues, 1874; F. M. Bailey, 1918; A. A. Saunders, 1921) and in Washington (W. L. Dawson and Bowles, 1909). South of this belt I find records for Oregon (Bendire, 1877; Cantwell, U.S. Biological Survey), Idaho (Merriam, 1873), Wyoming (W. C. Knight, 1902; Grave and Walker, 1913), South Dakota (McChesney, 1879) and Kossuth County, Iowa (R. M. Anderson, 1907). In Nebraska it breeds not uncommonly in the sand-hills of the western sections (Oberholser, 1920; Bruner, Wolcott and Swenk, 1905), and it nests rarely even as far south as Kansas (Goss, 1891; Bunker, 1913). According to Widmann (1907) the species nested in Clark County, Missouri, till recent times. In Colorado it breeds, according to Cooke (1906), W. L. Sclater (1912), Morrison (1888) and others, while in Utah it appears to be quite common, especially in the Salt Lake region (J. A. Allen, 1872; U.S. Biological Survey). From Nevada it has been variously reported and seems to be quite abundant (Ridgway, 1877; Oberholser, U.S. Biological Survey; V. Bailey, U.S. Biological Survey). It is not a common breeder on the Pacific coast, but is known from the Sacramento Valley (Heermann, *fide* Baird, Brewer and Ridgway, 1884) and thence south to San Jacinto Lake (Grinnell, Bryant and Storer, 1918). Mearns (1890) says it is common and presumably breeds in the mountains of Arizona, and recently Wetmore (1920) has recorded its breeding in some numbers on Lake Burford, New Mexico. According to Merrill (1878) some remain all summer near Fort Brown, Texas, and may very conceivably breed, though the locality would be unusual. North of the regular breeding area the species has been taken, presumably breeding, on Lake Athabasca and at Sitka, Alaska, September, 22, 1911. J. Grinnell (1910) also reports the fact that a flock of five was seen on July 16 in Glacier Bay, southeastern Alaska, and A. M. Bailey (MS.) saw a single pair in this same region in August, 1920. The species has also been twice taken on the Pribilov Islands (Hanna, 1920). Quite extraordinary is Turner's (1886) statement that the species occurs in the Aleutians, although not breeding. On the Yukon Delta, he says, it is common in summer. MacFarlane (1908) states that it may breed north to the Anderson River, and Richardson (*fide* Baird, Brewer and Ridgway, 1884) gives 68° north latitude as the northern limit, but I find no facts to substantiate these presumptions. The species has been known to straggle to Unalaska (March 18, 1879) and according to Cooke (1906) bred once on the St. Clair Flats, between Lakes Erie and Huron. Preble (1902) has recorded a specimen taken in August at Fort Churchill, and states that Bell took specimens on Hudson Bay. Verrill (1862) found a few apparently breeding on Anticosti Island in the Gulf of St. Lawrence, but Schmitt (1904) in his recent excellent monograph on the island, does not even mention the species as occurring there, and from its great scarcity all over New England and eastern Canada it could scarcely be more than accidental there.

Greenland

This duck has straggled as far north as Greenland although so far as I know only one specimen has been recorded and this was taken at Nanortalik, November 30, 1909 (Schiöler, 1912).

Iceland

Quite outside the regular European range it is remarkable to find the species breeding in Iceland, apparently not rarely; for Hantzsch (1905), the most recent writer on this district, records seven or eight authentic reports of its breeding in the vicinity of the

Myvatn and he himself found it nesting there. Its occurrence in any other section of Iceland is not yet sufficiently proved; but its appearance on the island is unquestionably to be explained by the presence of great numbers of other European species with which it probably arrives.

British Isles

In England it seems to be an introduced breeder only, but now nests in some numbers in Norfolk and Suffolk (British Ornith. Union Checklist, 1915). Since 1906 the Gadwall has also been breeding in Scotland. Baxter and Rintoul (1920) quote records of its nesting there in Peebles, Kinross, Caithness, Ross-shire, Sutherland and Fife.

Scandinavia

It is a rare bird in most of Scandinavia, unknown in Norway excepting for three sporadic occurrences at Bergen, Listerland and Jaederen (Schaanning, 1913), and in Sweden not occurring north of 61° north latitude. It probably nests sparingly throughout southern Sweden, however, in Skane, Gotland, Gothenburg (Nilsson, 1858), in Schonen (Wallengren, 1854), and more commonly near Stockholm (Meves, *fide* Dresser, 1871–81). It has been found occasionally in the last sixty years near Helsingfors, Finland (Palmgren, 1913). Schrader's (*fide* Pleske, 1886) statement that it breeds in Lapland is unquestionably erroneous. The species breeds in Denmark, at Fahnó and on the west coast of Jutland (Kjärbölling, 1850) as well as in Holland (Schlegel, 1859; van Oort, 1908; Albarda, 1886).

Germany

We have records of its breeding in many localities in Germany, where it seems to be increasing in the eastern sections. I find no records of its breeding in the extreme south, but it is recorded for Oldenburg (von Negelein, 1853), Hanover (Detmers, 1911; Löns, 1906), Anhalt (Baldamus, 1858), Brunswick (R. Blasius, 1896), Mecklenburg (Dahl, 1905; Wüstnei, 1898), Brandenburg (Schalow, 1915), eastern Prussia (Hartert, 1892), western Saxony (Helm, 1905), Lusatia (Hantzsch, 1903), and Silesia, where it is quite common (von Zedlitz, 1919, p. 120; Floricke, 1891). In Posen it is a very rare bird (Hammling, 1917).

Austria Hungary

The species also breeds in Bohemia (Fritsch, 1872; von Tschusi zu Schmidhoffen, 1890), in Slavonia (W. E. Clarke, 1884; von Schweppenburg, 1915), in Hungary (de Gyula, 1903) where in some places it is quite common (von Chernel, *fide* Naumann, 1896–1905), in eastern Galicia (Prazák, 1898) and in the Bukowina (von Tschusi zu Schmidhoffen, 1890) as well as in Transylvania (Csato, *fide* von Tschusi zu Schmidhoffen, 1890). At best, however, it is a very doubtful breeder throughout what was formerly the Dual Monarchy. On the other hand it appears to be extremely common as a breeder on the lower Danube, particularly in the Delta.

Balkans

I find it recorded for the Balkans from Bulgaria (Alléon, 1886; Reiser, 1894; Radakoff, 1879), Rumania (Radakoff, 1879; Lintia, 1909) particularly the Delta regions, Dobrudja and Bessarabia (Alléon, 1886; Sintenis, 1877; Radakoff, 1879; von Almásy, 1898). Elwes and Buckley (1870) think that some may nest in Macedonia while Reiser and von Führer (1896) say the same for Montenegro.

Poland and Baltic Provinces

Going north again, it breeds sparingly in Poland (Taczanowski, 1888; Katin, 1912) and most likely in Kurland and Livonia (Loudon, 1909). It does not breed in Esthonia, and I am of the opinion that its occurrence near Petrograd is only sporadic,

Russia

although Meves (*fide* Dresser, 1871–81) took a specimen on Ladoga in June. Büchner (1885) says it breeds sparingly near Petrograd, while J. von Fischer (1872) speaks of it as common in that vicinity. But there is no evidence to prove these last two statements, and the species is very probably of accidental occurrence both at Petrograd and at Novgorod (Bianchi, 1910). The specimens said to have been taken near Archangel are also very unusual and sporadic. There are three April records for Pskov (Zarudny, 1910). It breeds rarely in Jaroslav (Harvie-Brown, 1878) and farther east in Perm up to about 57° north latitude. It becomes more common farther south, in Moscow (Menzbier, 1881; Lorenz, 1892), thence eastward through Kazan (Russki, 1893) to southern Perm, where it is found at Ekaterinburg, and especially at Shadrinsk and Cheliabinsk. Moreover it breeds in Tambov (Dresser, 1871–81) and in Tula (Menzbier, 1881), in Orel (Goebel, 1871; Danilloff, 1864), Kief (Dresser, 1871–81), Charkow (Czernay, 1852), Voronetz (Czernay, 1852), Cherson (Brauner, 1894) and abundantly in Ekaterinoslav (Valkh, 1911) while in southeastern Russia it appears to be extremely abundant on the Volga in the vicinity of Sarepta (Moeschler, 1853; Becker,

1853). Dresser (1871–81) quotes Kessler as saying that it is less common in summer in southwestern than in southeastern Russia. Radde (1854) has recorded it for the Crimea but I am not sure that it breeds there. It apparently breeds throughout the Caucasus in suitable localities (Seebohm, 1883; Radde, 1884), particularly on the southern slopes, on Gotschai Lake and the Talysch lowlands. Before leaving Europe it may be well to speak of Spain, where the species breeds about the mouth of the Guadalquivir, at Santa Olaya (H. Saunders, 1871; Lilford, 1887), and at Zopiton and Santolalla (A. Chapman and Buck, 1910). H. Noble (1902) has also recorded its breeding in Andalucia. Across the Straits it has been reported near Tangiers (Carstensen, 1852) and farther east in Algeria (Baldamus, 1858; von Zedlitz, 1914). According to Paglia (*fide* Picchi, 1904) it once nested near Mantua, Italy. Bucknill's (1911) record of its occurrence in Cyprus at the end of May seems to indicate that this species like the Shoveller may breed there.

Caucasus

Spain

Northwest Africa

Italy

In Asia the species breeds throughout the Kirgis north of the Caspian and Aral Seas (Suschkin, 1914; Nazarow, 1887) and along the entire southern shore of the Caspian, whence it has been recorded for the southwest district by Radde (1886), and for the southern section by Zarudny (1911), who also records it as nesting in the Parapamis Mountains, and more rarely even as far south as the Seistan region of Afghanistan. Farther north in Transcaspia it was reported as a doubtful breeder by Radde and Walter (1889) who found it there in May, but Zarudny (1889-90) more recently has recorded it as being widely distributed in the Tedshen and in the Merv districts, and breeding on the Alikhanov Canal, where he found several nests. Molčanov (1912) states that it nests in some numbers in the delta of the Amur-Daria or Oxus. The species also breeds in northern and northeastern Turkestan (Dresser, 1876; Lansdell, 1885), but it probably does not occur in the desert region of southwestern Turkestan. In western Asia it breeds apparently as far south as Yarkand and southern Kashgaria (Koslow, 1899), but very probably is to be regarded as chiefly a migrant in these regions. I do not believe it will be found nesting in any part of Kashmir. Finsch (1879) found it in several localities in western Siberia, on the Sassyk Ala-kul, May 9, and on the Marka-kul as well. A little farther to the northeast it has been recorded as breeding about the Saissan-nor, at Minussinsk and in the Russian Altai (Suschkin, 1914), and in the whole of western Siberia its breeding range probably extends north to at least 58° north latitude. According to Ushakov (1913) it nests commonly in Tobolsk. Most astounding and inexplicable is Finsch's (1879) statement that he took a pair leading young in down on July 23 on the Shchucha River, a tributary of the Ob, which joins the latter river at its mouth in about latitude 67° north. Looking east again we find Radde's (1863) testimony for the species' breeding in the eastern Sajan Mountains and in Transbaikalia, where it was found also nesting in the Argun Mountains by Dybowski (Taczanowski, 1873). It apparently does not breed in Mongolia, nor has it been recorded from the lower Amur, but A. von Middendorff (1853) found it nesting in the Stanowoi Mountains, where it probably ranges north to about 60° north latitude, and also on the coast of the Ochotsk Sea. According to Taczanowski (1893) it extends eastward even to Kamchatka, and Dybowski (*fide* Stejneger, 1887; Sokolnikoff, in Hartert, 1920) found it on Bering Island. This is hardly sufficient evidence to warrant the inclusion of the regions as parts of the breeding range. Stejneger (1898) records it from the Kuriles on the testimony of Snow, but since we know nothing of its occurrence on Yezo or Saghalin I believe we must regard this record as doubtful or at best only a passage record of a specimen *en route* to Kamchatka.

Asia: Caspian Lands

Western Siberia

Baikal Region

Eastern Siberia

Winter Range

In the New World the Gadwall winters on the Pacific coast from Vancouver Island south through Washington and Oregon, Utah and the whole of California (Cooke, 1906; Grinnell, Bryant and Storer, 1918), rarely westward through Colorado (W. L. Sclater, 1912) and presumably occurs throughout Nevada in winter, as also in Arizona and New Mexico. It has been

North America

known to winter near a warm spring in Wyoming. Its chief winter quarters seem to be the basin of the lower Mississippi, north perhaps as far as southern Illinois (Ridgway, 1895) and Missouri, and very commonly in Arkansas (Howell, 1911), Louisiana (Beyer, Allison and Kopman, 1907) and Mississippi. By way of illustration in this connection it may be interesting to quote from an American sporting journal which estimates that in five months during the winter 1913–14 about 15,620 of this species were killed in Louisiana alone! Throughout the whole of Texas they are abundant in winter (Merrill, 1878; Beckham, 1888; Strecker, 1912) and the same is true of northern Mexico. It occurs throughout the whole of the peninsula of Lower California wherever food occurs and in Mexico on the west coast south to about Manzanillo, but reaches Barra de Santa Ana (Tabasco) on the eastern coast. For Mexico it has been variously reported for Sonora (Robinette, *fide* J. A. Allen, 1893), Chihuahua (Kennerly, *fide* Baird, Brewer and Ridgway, 1884), Presidio (Forrer, British Museum), Zacatecas (Richardson, *ibid.*), Mazatlan, Lake Chapala (Lawrence, 1874; Beebe, 1905), Guanajuato, Guadalajara (Dugés, 1869), Valle de Mexico (Herrera, 1888; Villada, 1891-92), Tehuacan, Vera Cruz, and Barra de Santa Ana (Ferrari-Perez, 1886). In the West Indies the species occurs irregularly but not very rarely on Jamaica (March, 1864; P. L. Sclater, 1910) but seems to be quite unusual on Cuba (Gundlach, 1871). In Florida it is quite common (Cory, 1896) but apparently does not occur south of Kissimmee (U.S. Biological Survey). Northward along the Atlantic coast it is considered a rare bird in Georgia and South Carolina (Wayne, 1910) and even in North Carolina it is not common (Pearson, Brimley and Brimley, 1919). It is said to be common on the Potomac and on the larger streams of West Virginia (Rives, 1890) and a few are thought to winter even in Maryland (Kirkwood, 1895). There is one record of its occurrence on Bermuda, December 20, 1849 (J. M. Jones, 1859). The species also winters in the Hawaiian Islands, whence it has been recorded for Oahu (R. C. L. Perkins, 1903).

Europe

In Europe the Gadwall does not ordinarily winter south of 15° north latitude nor north of about 50° north latitude excepting in western Europe where it winters much farther north.

British Isles

It has occurred on the Shetlands and Orkneys, for example, and according to G. R. Gray (1871) is perhaps not particularly rare in Scotland, where it has been met with in the Hebrides, in Forfar, Caithness, Glasgow, Islay, Renfrew, on the Tay and Forth Rivers, at Aberdeen, in Perth and in East Lothian. In the Outer Hebrides and especially in Tiree it is abundant in winter (Baxter and Rintoul, 1920). In England it is apparently to be met with sparingly throughout, while in Ireland it occurs rarely and chiefly in the eastern sections. W. Thompson (1851) records specimens from counties Down, Dublin, Westmeath, Wexford and Cork; and Ussher and Warren (1900) say it occurs irregularly in almost all the maritime provinces. On the Continent it is said to occur rarely in winter in

Holland

Holland (Dresser, 1871–81; Schlegel, 1859) and at the mouth of the Ems River (Detmers, 1911), but seems to be quite

Belgium

common in Belgium during the winter months according to Dubois (1886) and Longchamps (*fide* Dresser, 1871-81); although more recently Quinet (*fide* Ternier and Masse, 1907) states that it is rare there. Naumann (1896-1905) quotes authorities to show that at times the species

Germany

winters in various parts of Germany, *viz.* about Münster, at Neuwied, in Oldenburg and in southern Bavaria and Baden. It winters throughout France, but rarely in the

France

northern districts (Rogeron, 1903; Ternier and Masse, 1907; Paris, 1907), while in

Spain

Spain, especially in southern Spain, it appears to have once been abundant (H. Saunders, 1877; Reyes y Prosper, 1886; Arévalo y Baca, 1887). It is said to be not very

Balearics

common in the Basque Province (Aldaz y Amazabel, 1918). It winters also on the Balearics (Reyes y Prosper, 1886). Barboza du Bocage (*fide* Dresser, 1871–81) states

Portugal

that it is not common in Portugal as recorded by A. C. Smith (1868). Apparently

Italy

specimens have been taken only at Ovar and Ribatejo (Tait, 1896; de Seabra, 1910). It occurs in winter in Corsica (Jourdain, 1912) and in Sardinia (Salvadori, 1865), but is apparently not common in either island. On the other hand it is said to be abundant in Sicily,

especially about Lentini and Syracuse (Giglioli, 1886), and visits Malta only occasionally in winter (C. A. Wright, 1864; Despott, 1917). It is found throughout Italy in winter, being recorded from all the Provinces, Calabria, Apulia, the Marches, Tuscany, Liguria, Lombardy, Piedmont and Savoy (Giglioli, 1886, 1889–91), but is far from common in the peninsula, and quite rare in the northern sections. Althammer (1857) has recorded it for the Tyrol, and Fatio (1904) speaks of its occurrence in all parts of Switzerland, adding that it is not common. It winters to some extent in Hungary (Madarász, 1884), but probably in only the southern sections; according to Kolombatovič (1903) it is not rare in Dalmatia. Lodge (1909) says it is common at Durazzo, and Elwes and Buckley (1870) found it common in Macedonia, while Reiser (1894) quotes Hristovič for its occurrence at Sofia in winter. In Greece it has been found by Krüper (1862) and Lindermayer (1860) but according to von der Mühle (1844) it is not common there. Lilford (1875) speaks of finding it on the Ionian Isles, and Dresser (1871–81) gives the whole of Asia Minor as part of its winter habitat. Danford (1880) found it an abundant species in the Taurus, and it appears in Mesopotamia in great numbers during the inundations of the Euphrates (Ticehurst, Buxton and Cheesman, 1922, p. 655).

Tyrol

Switzerland

Hungary

Balkans

Asia Minor

The species is found in northern Africa in winter, and has been recorded as not common and irregular in Morocco (Favier, *fide* Dresser, 1871–81; Irby, 1875), though apparently quite abundant in Algeria (Salvin, 1859; Loche, 1867; Tristram, 1860; Taczanowski, 1870). Concerning Tunis, Whitaker (1905) says it is not rare, but irregular; König (1888) has also recorded it from Tunis. In the Nile Delta the species seems to be not uncommon, but is probably exceedingly rare farther up the river, even at Giza (Nicoll, 1909, 1919). Shelley (1872) says he shot it as far south as El Kab, about 19° north latitude. Von Heuglin (1873) took specimens in winter at Adowa, Abyssinia, but I am loath to believe that the species regularly passes so far south, and I find no further records for this region. Verreaux's (*fide* Layard, 1875–84) statement that the species had been taken on the Orange River, Cape of Good Hope, must, I believe, be accepted with reserve as being insufficiently proved. The fact that Bennett (Tristram, 1898) found it on Socotra, in the Gulf of Aden, and that von Heuglin (1873) took a half-starved specimen at Suakin on the Red Sea in October, seems to indicate that the species very occasionally strays along the Red Sea.

Northwest Africa

Egypt

In Palestine it was met with in winter by Tristram (1884), and Bucknill (1911) found it on Cyprus in December. It has been taken at Erzerum (Dresser, 1891) and winters, according to Zarudny (1911) in the Zaragoss and Mesopotamian regions of Persia. A few were seen on the lower Euphrates in February by a member of the British Expeditionary Force (London Field, Dec. 14, 1918). Blanford (1876) speaks of it as occurring all over Persia, and Zarudny (1911) says it is common in winter south of the Caspian, in the Parapamis, the Seistan, in Kuhistan and Kirman, and in both the northern and southern parts of Baluchistan. Farther north it seems to be common in Transcaspia where it was taken at Askhabad and Merv in December and January (Stolzmann, 1893), along the Tekes River (Loudon, 1910) and on the Murghab (Scully, 1887). C. Swinhoe (1882) speaks of it as common in midwinter in southern Afghanistan, and according to Sharpe (1889) specimens were taken in Badghis, extreme northwestern Afghanistan, in January and February. Stolzmann (1897) reports it as having been taken at Kokand, Ferghana, on February 10, but I do not believe the species ordinarily winters so far north in this region, and I am quite certain that Koslow's (1899) statement that it winters on the Bargrasch-kul (*circa* 87° east longitude, 42° north latitude) must be either erroneous, or very exceptional. At least the species seems to occur on passage only near Gilgit, northwestern Kashmir, though it winters in most of the Province (Hume and Marshall, 1879). In the district about Kohat and Kurram it is rare in winter (C. H. T. Whitehead, 1909), but south and east of this region it becomes exceedingly common throughout northern India south of the Himalayas as far as Mysore, 13° or 14° north latitude. Within this area it is abundant in Sind, Punjab, the Northwest Provinces and Bengal, in Bombay and Mysore, but not in

Asia

Madras (Baker, 1908), extending eastward through Assam, Manipur and Tipperah to Burma. It has been recorded from Arakan by Blyth (1875), and recently Bingham and Thompson (1900) and Rippon (1901) reported it common in the South Shan States. Thence eastward it occurs in southern China, but is apparently far from common in that country. It has been variously reported by David and Oustalet (1877) and by Seebohm (1884), for Foochow by Rickett (1894), for Ningpo by R. Swinhoe (1873), for the lower Yangtse by Styan (1891), and for Shanghai by Wade (1895) and Swinhoe (von Heuglin, 1874). I know nothing of its occurrence in Formosa or in the Loo-choo Islands, but it is found in winter in southern Japan, where it has been taken at Nagasaki and Yokohama (Seebohm, 1890). According to Blakiston and Pryer (1882) it winters even north of Tokio. From northern Japan or Yezo we have no records.

Passage Area

In North America, and Europe and Asia as well, there is a certain area in which the bird is known primarily or wholly as a migrant, and this region, in the New World, extends from Colorado, through

North America

southern Nebraska and Kansas, Iowa, Missouri and Illinois, thence east to the Alleghany Mountains, perhaps including parts of Tennessee and Kentucky, and certainly Indiana, Michigan, Ohio, Pennsylvania and New York. The Gadwall is extremely rare on the Atlantic coast from Chesapeake Bay north through New Jersey and all of New England, becoming sporadic in Nova Scotia, New Brunswick as well as in Quebec and most of Ontario (J. and J. M. Macoun, 1909; Dionne, 1906; McIlwraith, 1894). The evidence for these remarks is not meager. Though the species winters and breeds in Colorado, it occurs chiefly on passage (W. L. Sclater, 1912). It is common on passage in Kansas (Goss, 1891) and in Nebraska (W. E. Taylor and Van Vleet, 1888), not rare on passage in northern Illinois (Nehrling, 1885), and occurs in Michigan (Barrows, 1912), Pennsylvania (Todd, 1904) and in New York (Eaton, 1910). On Delaware Bay and in New Jersey it is known as a rare transient (W. Stone, 1909) and the same is even more true of New England (G. M. Allen, 1909; and others).

In Europe the species is to be regarded primarily as a bird of passage in Holland, Belgium, France, excepting the southern parts, extreme northern Italy, Lorraine, Switzerland, extreme southern and

Europe

western Germany, Austria, Bohemia, Galicia and southern Poland, for although it breeds in many of these regions and winters in others, yet in some it occurs only on passage, as in Lorraine (d'Hamonville, 1895; von Besserer, 1899), and in all the specified areas it is known chiefly as a migrant.

In Asia, as in America and Europe, there is also an extended area in which the species occurs primarily or wholly on passage, and Oustalet (1894) some time ago called attention to this fact when he

Asia

spoke of the species as traversing central Asia on migration. Meager as our data are, this area may be said roughly to extend from eastern Turkestan, or perhaps even eastern Transcaspia (Merv), along the northern parts of Kashmir and then to follow the course of the Himalayas through northwestern China, across the Yellow Sea (excluding Korea) and the course of the Ussuri northward to Uda Bay. Thence it runs southwestward along the northern edge of the Mongolian deserts till it reaches Turkestan again. Our information concerning the occurrence of this species is very defective, but a few facts will serve to clarify the situation. In southwestern Turkestan, says Lansdell (1885), the species occurs on passage, and concerning northwestern Kashmir the same is true according to Biddulph (1881). Scully (1879) says the birds do not winter in Nepal, but are common on passage; the same is probably true of the whole Himalayan range. In northern Tibet and on the Lob-nor it occurs on passage (Koslow, 1899), and specimens have been taken at Aktarma and Lob-nor during the second half of October (Oustalet, 1894). It occurs on passage in Yarkand and Kashgaria (Koslow, 1899) and in southeastern Mongolia (Prjevalski, 1878). According to the same writer one specimen was also taken at Lake Hanka in late April. The species is unknown from Korea

or the lower Amur, and is probably of very exceptional occurrence east of longitude 120° east and between 40° and 50° north latitude.

Migration

I know of nothing concerning the migration of this species which could be called characteristic. The comparative proximity of the breeding and wintering ranges results very naturally in a somewhat less extended period of migration activity than is the case with some ducks. In northern Africa Gadwall apparently start north as early as February (Whitaker, 1905) and the same is true of southern sections of Europe, the Tyrol, for example. In most parts of southern Europe the species passes in early March, arriving in central Europe about March 20 to 25. For Hungary the average date of arrival for fifteen years was March 22. The birds reach northern Germany in late March and early April. Apparently there is no more activity after April 15. In autumn the birds rarely start south as early as September, but leave Germany in October, passing through Switzerland in October and November, and arriving at Tunis in late October and November.

In Asia the birds seem to migrate somewhat earlier in the autumn, some appearing in the Himalayas in late September. But they do not arrive in the plains of India until October or even November. In spring they start north in March and pass through the Himalayas in the course of that month and the next, lingering as late as May in Kashmir and surrounding districts, and even so far south as Sind.

For America a few dates from Cooke (1906) will suffice to illustrate similar conditions. The birds arrive in Iowa and Colorado in the first half of March, farther north in Minnesota and Montana about April 1, and in their northernmost range, Manitoba, about April 20, Saskatchewan, April 25. Data for the autumn migration are very scant, but what there are seem to indicate a somewhat earlier passage than that seen in Europe and Asia. Some of the birds arrived as far south as the southern end of Lower California in late September, and the species was abundant in northern Mexico about the same time. Farther south, however, at Mazatlan and in the Valle de Mexico they do not appear to be common until November. They linger in the northern United States, Minnesota, for example, until early November.

It seems quite certain from the scarcity of spring records for the North Atlantic coast, that the spring migration is over a more westerly route and is perhaps more concentrated.

The few young Gadwall that have been banded in England point to the existence of a local stock which does not leave the British Isles in winter.

GENERAL HABITS

Haunts. The Gadwall is somewhat distantly related to the Mallard, approaching more nearly the Widgeon and the Falcated Teal. Although its range is very extensive it is a common bird in only a few districts, for it is almost everywhere vastly outnumbered by Mallard, Widgeon, Pintail and Teal. It is, far more than the other surface-feeders, a strictly fresh-water duck. In England, says Millais (1902), it will at times rest on the sea by day, although it is even less a marine bird than the Mallard. The island of Tiree (Inner Hebrides, Scotland), is the only place I have ever heard of where Gadwall stay on the open sea during daylight hours (Harvie-Brown and Buckley, 1892). On our own Atlantic coast they are very seldom taken on salt-marshes, and in California they avoid both the salt water and the alkali ponds (Grinnell, Bryant and Storer, 1918). Their regular habitat differs not at all

The tracheal dilatation in the male is left-sided and quite similar to that of the Widgeon.

Food. By far the most important study of the food of this duck was made by D. C. Mabbott (1920) and other assistants of the U.S. Biological Survey. The character of the diet is summarized by his preliminary statement: "The food of both the Gadwall and the Baldpate is quite different in some respects from that of the Mallard: these two feed to a very large extent upon the leaves and stems of water plants, paying less attention to the seeds, while the Mallard feeds indiscriminately on both, or even shows some preference for the seeds." The fact is that the Gadwall is more purely vegetarian, both in summer and in winter, than any of the other carefully studied American species of shoal-water ducks. The analysis made was based on 417 stomachs, most of which came from birds taken in the autumn and winter in Arkansas, Utah, North Carolina, North Dakota, Florida and other States. These autumn and winter (September to March) stomachs contained over 97% vegetable matter and only about 2% of animal matter. The vegetable portion consisted of pond-weeds (42.3%), sedges (19.9%), algæ (10.4%), coon-tail (7.8%), grasses (7.6%), arrow-heads (3.2%), rice and other cultivated grain (1.3%), duck-weeds (0.6%), smart-weeds (0.6%), wild celery and water-weeds (0.5%), waterlilies (0.5%), madder family (0.3%), and miscellaneous (2.6%). The predominant food is, therefore, the leaves and stems of the pond-weeds. What little animal food was taken consisted of a great variety of mollusks, insects (chiefly larval stages) and a very few crustaceans. An interesting find was that of reproductive buds of fresh-water Bryozoa.

The summer stomachs of adults, of which there were only thirteen, are especially interesting because they contain only 11% of animal food. If this represents a fair average, it is certainly a remarkably small amount. The stomachs of eleven young, collected mostly in North Dakota, contained water-bugs (56%), beetles (7%), flies and their larvæ (2%), nymphs of dragon-flies and damsel-flies (0.27%), other insects (2%), the total animal food being 67.54%.

A long account of the food of this duck in Europe is given by Naumann (1896–1905). There, too, the pond-weed seems to be one of the favorite foods, but according to this writer the Gadwall feeds also on small *Conchylia*, spawn of fish and frogs, and in case of necessity even small fish or frogs. Of the grains, he says, they like oats only, though they will feed on rice; but they will not eat barley at any time.

In India, according to Hume and Marshall (1879), they feed extensively on wild or cultivated rice, seeds, leaves and flower-buds of all kinds of rushes and aquatic plants, insects and their larvæ, and sometimes small worms, but these authors never found frogs or fish in Gadwalls' stomachs. A curious note given by them is worth quoting: the Gadwall "may often be seen trotting about on tiny smooth grass

patches at the margins of broads, busily devouring grasshoppers, crickets and (strange though it may seem, it is the fact) small moths and butterflies."

COURTSHIP AND NESTING. In all parts of its range the Gadwall breeds a little later than the Mallard, perhaps averaging nearly three weeks later. In America, where the Mallard lays chiefly in April and early May, the Gadwall lays in the latter half of May and in June. In the great breeding center, in North Dakota, for example, Job (1902) found them laying from June 10 on, and Bent (1901–02) found full clutches of eggs in various stages of incubation on June 15, while in southern Saskatchewan most records are for late June (J. and J. M. Macoun, 1909). An Idaho record is for late June (Merriam, 1873), and in Montana downy young may be seen in June and July (A. A. Saunders, 1921). In Washington and Oregon it breeds not earlier than June (W. L. Dawson and Bowles, 1909; U. S. Biological Survey records); at Lake Burford, New Mexico, females were beginning to lay at the end of May (Wetmore, 1920). Southern California dates are mostly for June.

In Iceland a clutch was found as early as June 12 and a female with downy young was taken in the first days of August (Hantzsch, 1905). The breeding records for Scotland seem to be June dates (Baxter and Rintoul, 1920) but in Germany the species is said to lay chiefly in the second half of May (Naumann, 1896–1905). Eggs were taken in late May in Hungary, and at the same period in Bulgaria and southern Russia. In Transcaspia eggs were taken in the middle of May (Naumann, 1896–1905). On the lower Ob, Finsch (1879) saw a female and downy young on July 23, the most northern breeding record.

Display can be seen as well in captive specimens as in the wild, and is a far simpler performance than that of the Mallard (see Plate 32). Early in May the male of a pair which I recently had would perform actively every afternoon. The neck was held perpendicularly and the head moved straight up and down many times, the whole carriage of the bird on the water being very erect and animated. During this exhibition a sort of lump appeared in the throat, but I could hear no sound, even though the birds were only a few feet away. I have even seen this up-and-down motion of the head carried out while the male was running about on the bank. But I have not seen the male bend over and touch his abdomen with his bill, the "No. 2 posture" of Wormald (1913), and one so characteristic of the Mallard, Pintail and Teal. Heinroth (1911) also is very definite on this point, though Wormald (1913) implies that it is occasionally indulged in. The courtship note is a very loud, monotonous croaking noise, and this is the only call I have heard. According to Heinroth (1911), however, this call is immediately preceded by a high whistle and Wetmore (1920) also speaks of a "shrill whistled call" heard during the breeding season. It seems as if we still had a good deal to learn about duck language, especially courtship notes.

When the birds have reached the nesting grounds they may be seen engaged in the so-called nuptial flights so characteristic of the Mallard, Pintail, Widgeon and Teal. Those who have been fortunate enough to witness these flights have described them as among the most beautiful evolutions common to water-fowl. F. M. Chapman (1908) described the birds as "going at full speed and twisting and turning with the erratic flight of a barn swallow." A more recent and detailed description is given by Wetmore (1920) who observed them in New Mexico. He says that the mating flight is constantly seen on the breeding grounds, and is apparently more common than in other ducks. "The female rose with a slow flapping flight, with usually two males in pursuit, calling and whistling constantly. First one, then the other male swung in front of her, set his wings, inclined his body upward to show his handsome markings, and after a few seconds dropped back again to his former position." Wetmore evidently considers this a part of the display, and noted that late in the season one of the males was always apparently more favored than the other, flying close to the female so that his wings struck hers in passing, making a rattling noise. During these flights the birds often rose to three hundred yards and darted from side to side, flying sometimes rapidly, sometimes slowly.

The mating act is described by Wetmore as follows: the male swam toward the female, bowing by extending his neck until his head was erect, then retracting it (this is the ordinary type of display). He then approached, pressing his breast against the sides of the female, and shoving her easily first on one side then on the other, biting her back and rump gently as he did so. After a few seconds she lowered her body in the water and copulation took place with the female entirely submerged, save for the crown of her head, while half of the body of the male was under water. As the female emerged the male turned immediately to face her, bowing deeply and giving a deep reedy call as he did so. The postlude, then, is evidently quite different from that of the Mallard.

The Gadwall nests in the same localities as do Mallard, Pintail, Widgeon and Teal, and so far as known the nest is always on the ground, differing in no way from the nest of other surface-feeders. The clutch numbers from seven to thirteen, the average for a full clutch being probably between ten and eleven. Fifteen eggs seems to be the highest number recorded (V. Bailey, MS.). The sets are perhaps larger under the favorable conditions of our western prairies than they are in Europe, where nine seems to be the usual number (Naumann, 1896–1905). The Gadwall apparently never deposits its eggs indiscriminately in the nests of other birds, but, as remarked above, the Baldpate, Lesser Scaup and White-winged Scoters have been found laying in Gadwalls' nests. The eggs are ordinarily bluntly oval in shape, smooth and glossy, varying in color from cream to grayish green. Eggs in the U.S. National Museum measure from 51–55.5 mm. in length and 37.5–40 mm. in breadth (Grinnell, Bryant and Storer, 1918). Larger and smaller eggs are listed by Naumann (1896–

1905), several being from 56–58 mm. in length, and going as high as 40.6 mm. in width. The average of twenty-one North Dakota eggs was 52.8 by 39.4 mm. (Bent, 1901–02). These eggs are very difficult to distinguish from those of the Pintail, Widgeon and Shoveller. They differ from those of the American Widgeon by being usually whiter and less creamy, as well as slightly shorter and more rounded (Bent, 1901–02). The nests can probably be best distinguished by the nest-down which is characteristic, being very dark, with small light centers and distinct gray points, not easily to be confused with that of any other species (H. Noble, 1908).

The incubation period is from twenty-six to twenty-eight days (Job, 1902; Heinroth, 1908), probably differing not at all from that of the Mallard. Mr. Wormald hatched some in twenty-three or twenty-four days, but duck eggs seem to hatch a little quicker under artificial conditions. Major Allan Brooks has told me that in his opinion the male Gadwall is somewhat more domestic in disposition than the males of other ducks, meaning thereby that the male stays longer with the incubating female. I am not certain that this is actually so, for the females, being such late nesters, tend to keep the males on the breeding places longer anyway. Wetmore (1921) at Bear River, Utah, occasionally saw a male accompanying the female and brood, but thinks such instances are very exceptional. Most males leave the females toward the middle or end of the incubation and begin to take on the eclipse plumage by the last of May or early June. Bent says that this plumage is not complete until around August 10, and he has seen it as late as September 8.

Status. It is very difficult to compare the numbers of this species at present taken, because in many places it is so uncommon, and so easily confused with other ducks that it does not appear on the record books of shooting clubs or on market lists. The Gadwall differs from other northern-hemisphere ducks in being almost everywhere a comparatively uncommon bird. Forbush (1912) thinks that it was once not uncommon in New England, but I find very little evidence to support this opinion. No doubt there have always been times when small flights touched New England, as happened in October, 1904, at Merrymeeting Bay, Maine (Norton, 1916). The only specimen I ever saw or shot at Wenham Lake, Massachusetts, in twenty-two years was taken on October 26 of that same year.

The only accurate figures which I have for eastern Canada are those for the Long Point Club, on the northern shore of Lake Erie. No records of the Gadwall were kept before the year 1907. Between 1907 and 1920, out of a total of 61,063 ducks shot, only 60 were Gadwall (about 0.1%). At the Monroe Marsh Shooting Club (western end of Lake Erie) out of a total of 40,615 ducks taken in the autumn season between the years 1885 and 1901, only 174 Gadwall appear (0.4%). Out of 12,330 ducks shot there in the spring over the same period only three Gadwall were taken, at first sight showing quite conclusively that this species takes a more western

course in its flight back to the breeding grounds, but on account of restrictive laws I find that the spring records are not comparable with the autumn ones. Near Delavan, Wisconsin, of 1167 ducks shot in the autumn seasons of 1892 to 1899 only ten were Gadwall (Hollister, 1920). The report of the Minnesota Game Commission for 1919 to 1920 shows that between 5000 and 6000 Gadwall are killed in that State annually. This is only about 0.1% of the total.

Along the coasts of Connecticut, New York, New Jersey, Delaware, Maryland and Virginia the Gadwall becomes increasingly more frequent in the autumn as one goes south, but it does not become at all common until one reaches Virginia and the Carolinas. Here the great fresh-water sounds are better adapted to it, and records of considerable interest are available. At the Swan Island Club (Currituck, North Carolina) between the years 1909 and 1918 out of a total of over 24,000 ducks, 753 were Gadwall (3+%). At the Princess Anne Club a few miles farther north in Virginia over a period of twenty-eight years only 253 are recorded, representing less than 1%, but for the first seven years they were not distinguished from other ducks. Twenty miles farther south, at the Currituck Club the records were carefully kept between the years 1888 and 1910. They show that the Gadwall represented about 5.5% of the total number of ducks taken. The years 1911 to 1918 show no appreciable change, the annual number of Gadwall being from 152 to 332. The largest season in twenty-nine years was that of 1917–18. At the Narrows Island Club, only a short distance away, 908 are recorded for eighteen years of shooting (less than 4%) and there is no evidence of any recent lessening of the annual bag. At the Santee Club (mouth of the Santee River, South Carolina) from 15 to 45 Gadwall are taken each year in an annual total of 2500 to 3000 ducks, that is, about 1%, considerably less than in North Carolina. But these last records have probably not been kept so well as farther north where the sportsmen have more intelligent assistants. In the intermediate territory, on the more salty sounds of Albemarle and Pamlico, Gadwall are extremely rare. An artificial pond at a club on Pea Island, Dare County, North Carolina, contains a very few in seasons when the water is fresh, but none at all if the ocean breaks through and makes the water brackish. At the Canaveral Club near Titusville, Florida, Gadwall represent less than 2% of all ducks shot in the past thirteen years.

On the Gulf coast of western Florida, McAtee found it the commonest duck at St. Vincent's Island in January and abundant in the autumn. It is also plentiful on the coast of Louisiana. An idea of its numbers there may be gained from an estimate made of the ducks brought to the New Orleans market in the season 1913–14. Of a total of 283,435 ducks about 15,620 were Gadwall (about 6%). The species seems to be equally common on the Gulf coast of Texas, where in the vicinity of Fort Brown it was said by Merrill (1878) to be the commonest duck. The U.S. Biological Survey field notes show it to be common all along that coast, and near

Tampico the birds may be seen in thousands (Sanford, Bishop and Van Dyke, 1903).

The great breeding area in North America centers in North Dakota, where all observers have found it extremely abundant, even equalling the Mallard in the vicinity of Dawson, where 300 pairs were counted in July (U.S. Biological Survey). As far west as Malheur Lake in Oregon as many as 200 pairs were said to be nesting in 1915 (Cantwell, U.S. Biological Survey records). On the Bear River marshes of Utah it was fifth in order of abundance among breeding ducks, and Wetmore (1921) estimated that in the years 1914 to 1916 some 200 pairs nested there annually. In New Mexico it was thought that 60 pairs were breeding on Lake Burford, where they outnumbered the Mallards, and were the most common breeding ducks (Wetmore, 1920). Other observers have placed this colony of Gadwall much higher, up to 2000! (U.S. Biological Survey, field notes). On migration the species is common enough in Colorado and Nevada to equal or outnumber any other kind of duck (U.S. Biological Survey, field notes). In the Rio Grande Valley it represented only about 2% of a hunter's bag (Leopold, 1919). An idea as to its much lower status in California may be obtained from the market records. In the season of 1895–96, only 671 Gadwall as against 47,565 Mallard were brought in to San Francisco markets (Grinnell, Bryant and Storer, 1918). The Hunters' Game Transfer Company of San Francisco marketed 2942 out of a total of 357,114 ducks in the five seasons from 1906 to 1911. In the San Francisco market in 1910–11 there were 1299 Gadwall out of a total of 185,867 ducks.

To sum up the evidence for increase or decrease in America from the above data and many other notes, it may be said that the Gadwall shows no very great diminution in numbers on its wintering grounds and during the last few years it has shown an increase in the Mississippi Valley. In Minnesota there are such great variations in the numbers of breeding birds, that it is almost impossible to get a correct idea of the present status. For instance, it was described as more common than the Mallard there in 1880 (Roberts and Benner, 1880) and forty years later it was said to be greatly reduced there (Roberts, 1919). In the Edmonton region of Alberta, Mr. William Rowan writes me that he considers it still plentiful, although scarcer than formerly.

In the British Isles the Gadwall was always a rare and local visitor, until artificially induced to nest in Norfolk about 1850, after which it became for a time quite common locally. In the last thirty years it is steadily decreasing again, at least as a breeding bird (Millais, 1902; Stonham, 1908). In Scotland it was not known to breed until fifteen years ago, but since that time it seems to have slowly increased (Baxter and Rintoul, 1920). An idea of its general status in England may be obtained from the fact that out of 96,000 ducks taken in the thirty-five years between 1833 and 1867, at the Ashby Decoy, only 22 were Gadwall!

On the Continent the species seems to be holding its own in Germany, perhaps

even becoming more common as a breeding bird in central and eastern Germany, and in eastern Galicia (von Homeyer, 1881; Prazak, 1898). In France, on the other hand, it certainly does not seem to be increasing, and is perhaps becoming even more rare than formerly (Ternier and Masse, 1907). I was told by several bird-lovers in Holland that it was getting very scarce all over western Europe and that it had been taken only once in the Nadermeer Lake, near Amsterdam, in recent years.

There are too few notes to enable one to establish its status in Asia, but in India it is perhaps the most abundant duck in Hindustan. In Bengal it is twice as common as all other ducks combined (Baker, 1908)!

Enemies. So far as known the enemies of the Gadwall are the same as those of the Mallard and other surface-feeding ducks.

Damage. Probably much less damage is done to crops by this species than by some of its more numerous relatives.

Food Value. I have no reason to think that the flesh of the Gadwall differs in any way from that of other shoal-water ducks killed under similar conditions. Audubon classed it as equal to that of the Redhead (*Nyroca americana*) and in only one place have I found it mentioned as inferior. Belding and Bendire (*fide* Grinnell, Bryant and Storer, 1918) speak of it as sometimes oily, fishy and inedible in California. Others have called attention to a "sedgy" taste. In India its reputation is as high as in other parts of the world, and Baker (1908) regards it as not even second to the Mallard or Pintail. He says the birds always arrive in India in better condition than the Mallard or else they fatten more rapidly after arriving. The fact that the Mallard comes a greater distance on migration may perhaps explain this.

Hunt. The sportsman of our Atlantic coast has little chance to note the characteristics of this duck, for it does not come very readily to decoys, and is really only an accidental portion of the bag. In Europe, too, it is a rare game-bird, taken only occasionally in the decoy-pipes, and by the hut-shooters of the French marshes. In India as many as eighty have been taken by three guns in one of the great duck drives so vividly described by Baker (1908). In these hunts a line of boats is rowed slowly the length of one of the large *jheels*, returning in the evening. A shooter stationed in the bow of each boat is kept busy shooting at Gadwall, Pintail, Pochards, Cotton Teal and Tree Ducks. Methods of taking Gadwall do not differ from those employed in getting at most other kinds of shoal-water ducks.

Behavior in Captivity. Gadwall are not sufficiently showy birds to be general favorities with aviculturalists. But they do extremely well, even though they cannot

be considered easy birds to breed. In this country few fanciers have been successful in rearing them. Of some interest is an old remark by Audubon to the effect that he saw a large flock in confinement in Dutchess County, New York, in 1812, which had bred many times, and had become quite "domesticated." More recently the species was bred by Mr. Percy K. Hudson (*fide* L. S. Crandall, *in litt.*). The few birds I myself have kept, showed themselves very active in display but never went so far as even to build a nest. They do not command a high price and can often be bought for $6.00 or $8.00 a pair, but hand-reared specimens should be sought for if one really wants to breed them, and these of course are more expensive.

In Europe they bred in the Zoological Gardens in London in 1839 and in many subsequent years. The dates of hatching are interesting as being almost all in late June or early July (P. L. Sclater, 1880). They have also bred freely in a semi-domesticated state on the Duke of Bedford's estate, and in a number of other English parks.

The length of life of Gadwall kept in the London Gardens was a trifle less than that of other common shoal-water ducks. The average of ten birds was four years two months, the maximum being ten years two months (P. C. Mitchell, 1911). They breed when one year old. Good hand-reared stock is sold in England for about forty shillings the pair but they are not easy to get and should be spoken for long in advance.

Hybrids. In the wild state Gadwall very rarely cross with other species, certainly less frequently than the Mallard, Black Duck, Widgeon and Pintail. Crosses with the Mallard, Pintail, Shoveller, European and American Widgeon have, however, been taken (Suchetet, 1896; Millais, 1902; W. G. Smith, 1887). In captivity Rogeron (1903) succeeded in crossing the Gadwall and the Mallard and then mated the hybrids with the Pochard (*Nyroca ferina*). Presumably these triple hybrids were sterile, but there is no information on this point. A Mallard-Gadwall hybrid has also been mated with the European Widgeon and produced young (Selys, *fide* Fatio, 1904).

COUES'S GADWALL

ANAS COUESI (STREETS)

(Plate 27)

SYNONYMY

?*Anas strepera* Forster, Descriptiones Animalium, p. 156, 1844.
Chaulelasmus strepera, var.? G. R. Gray, Cat. Birds Tropical Ids., p. 55, 1859.
Chaulelasmus couesi Streets, Bull. Nuttall Ornith. Club, vol. 1, p. 46, 1876.
Anas couesi Seebohm, History of British Birds, vol. 3, p. 531, 1885.

VERNACULAR NAME

English: Coues's Gadwall.

DESCRIPTION

MALE (type, no. 67,325 in U.S. National Museum, taken on Washington Island, Fanning group, by Dr. T. H. Streets, January, 1874): This specimen may not be adult, and is not in very good condition. It has the general appearance of *Anas strepera* in eclipse or half-adult plumage. There is no vermiculated appearance except a very small amount on the wing-coverts. The mantle, back, breast and under parts are essentially those of a female Gadwall. The head is in such poor condition that the colors are scarcely to be made out. The lamellæ of the bill are small and closely packed, and greatly exceed those in *Anas strepera*.

Size much smaller than Gadwall. Wing 199 mm.; bill 37; tarsus 36.

FEMALE: This is essentially a small female Gadwall, but the greater wing-coverts are not black, and the inner part of the speculum is gray, not white, but this might well be a juvenile character.

DISTRIBUTION

FOUND on Washington and New York Islands, Fanning group (north latitude 6°, west longitude 160°).

GENERAL

THIS duck has never been found since it was discovered in 1874 by Streets on the lake and in the peat-bogs of Washington Island. We do not know whether the species still exists, or whether it has been destroyed by the introduction of foreign mammals. Mr. R. H. Beck, collecting for the Whitney South Sea Expedition of the American Museum of Natural History, will, I hope, soon be able to tell us whether or not it is extinct. Dr. Robert Cushman Murphy tells me that he has recently received a letter from Dr. Ball of the Bishop Museum (Honolulu) in which it is stated that the Bishop Museum during its expedition to the island in the summer of 1922 could not find the bird.

FALCATED TEAL

ANAS FALCATA GEORGI

(Plate 28)

SYNONYMY

Anas falcata Georgi, Reise Russ. Reichs, vol. 1, p. 167, 1775.

Anas falcaria Pallas, Reise Russ. Reichs, vol. 3, p. 701, 1776.

Anas javana Boddaert, Tabl. des Planches Enluminées, p. 55, 1783.

Anas javanensis Bonnaterre, Encyclop. Méthodique, vol. 1, p. 160, pl. 39, fig. 3, 1791.

Anas drepanopteros Pallas, Zoographia Rosso-Asiatica, vol. 2, p. 259, 1811.

Aix falcaria Boie, Oken's Isis, 1828, col. 329.

Querquedula falcaria Eyton, Monograph Anatidæ, p. 126, 1838.

Querquedula falcata G. R. Gray, Genera of Birds, pt. 3, p. 616, 1845.

Querquedula javana G. R. Gray, Genera of Birds, pt. 3, p. 616, 1845.

Querquedula drepanopterus Bonaparte, Revue Critique, p. 103, 1850.

Querquedula javanensis Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.

Eunetta falcata Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.

Mareca falcata Cassin, Expedition Amer. Squadron China Seas and Japan, vol. 2, p. 231, 1856.

Querquedula multicolor R. Swinhoe (*nec* Scopoli), Ibis, ser. 1, vol. 2, p. 67, 1860.

VERNACULAR NAMES

English: Falcated Teal, Crested Teal, Bronze-capped Teal.

German: Sichelente, Sichelflügelige Ente, Sichelförmige Kriechente.

French: Canard cerclé, Canard à faucille.

Italian: Anitra falcata.

Croatian: Patka srpasta.

Czech: Cirka srpopera.

Polish: Kaczka grzechotka.

Swedish: Practand.

Hungarian: Sarlos recze.

Russian: Utka kosatchca, Kassatoi-selesenn, Rasskrassivi-seleseni.

Yakut: Chapry-kogoni.

Japanese: Yoshigamo.

Hindu: Kala sinkhar.

DESCRIPTION

ADULT MALE: Crown deep chestnut; sides of the head bronze-purple, greener posteriorly; a long green mane on the back of the nape; throat and upper part of the neck white, intersected below by a green collar; mantle and upper scapulars with narrow crescentic bands of gray and blackish; rump blackish; basal upper tail-coverts gray, vermiculated with black, the longer ones black and entirely hiding the tail; upper breast waved with alternate crescentic bars of black and white, producing a regular scaled appearance; lower breast whitish, each feather with black bars, one of which is subterminal; sides, flanks, and abdomen waved with narrow black and grayish bands; under tail-coverts black, very long, and reaching beyond the tail, on each side of the under tail-coverts a very distinct buff patch, the bases of the feathers being black, showing a beautiful black bar, which separates the buffy patch from another silky white band formed by the tip of lowest flank feathers; scapulars gray, narrowly waved with black, and more or less distinctly whitish on the edges; a black patch on the outer scapulars; wing-coverts gray, the last row whitish; wing speculum on the secondaries dark glossy green, bounded below by a narrow whitish band at the tip of the secondaries; tertials very long and narrow, sickle-shaped, with the shafts whitish, the webs velvety glossy black, the edges and parts of the inner webs gray; quills dark gray, almost blackish toward the tip; under wing-coverts white, but the greater ones gray; axillars white; tail-feathers gray, with narrow white edge (Salvadori, 1895).

Iris dark brown. Bill dark horn-color, almost black. Legs and feet yellowish to dull bluish gray. (Live specimen at Wenham.)

Wing 225–242 mm.; tarsus 37–40; bill 41.

ADULT FEMALE: Superficially resembles female of *Anas strepera*, but head has a crest and the speculum has no posterior white patch. Rump and upper tail-feathers of *Anas falcata* banded with fulvous, but unbanded in the Gadwall. Upper breast darker than abdomen and with dark crescentic bands. Upper side has the feathers conspicuously banded and edged with fulvous.

Colors of soft parts as in male, but culmen more or less freckled with black; lower mandible yellow in the Gadwall, and black in the present species.

Wing 227 mm.; bill 39; tarsus 37–39.

ADULT MALE IN ECLIPSE PLUMAGE (see plate): Wing with the new feathers similar to breeding (winter) plumage; mantle, scapulars, and back dark brown with a very few maculated white-and-black feathers scattered through the mantle. Tail slate-colored. Head like that of adult female, but slightly iridescent on occiput. Lower surface very much like female Gadwall: yellowish white spotted with brown, the spots large on the breast. The tertials are only as long as the fourth primary and are plain-colored (specimen from northeastern Siberia, September 7, 1900, in American Museum of Natural History).

YOUNG MALE (in January): Still has some brown feathers in the mantle. Sickle-feathers not yet developed, although rest of plumage is very nearly adult. The plumage is said to be practically complete by the beginning of March (St. Quintin, 1917) but I do not believe this holds true for all young males.

YOUNG FEMALE: Like adult, but without elongated feathers at the back of the head. Tertials browner, and speculum less brilliant.

YOUNG IN DOWN: Said by Mr. St. Quintin to resemble closely the young of the European Widgeon, but the sides of the head reddish and the bill longer and stouter. The line through the eye is not well

FALCATED TEAL

Adult Female

defined and there is no aural spot nor any line extending backward from the angle of the mouth. As the ducklings grow the red on the cheeks vanishes. The young of *Anas penelope* are very often red on the cheeks, and have no face stripes.

DISTRIBUTION

THE Falcated Teal is a migratory species whose habitat is eastern Asia, east of the Jenesei (Pallas, 1831). I have been unable to find any specific record of its occurrence on the Jenesei, or anywhere in this region west of Irkutsk, where it is quite common (Radde, 1863). A. von Middendorff (1853) says that at Dúdino on the Jenesei (69° 30′ north latitude) a duck answering the description of the present species was said to have been taken, but this seems to me to be so far north as to be hardly more than a straggler. Suschkin (1913) also says it straggles to Minussinsk on the upper Jenesei, and breeds rarely on the lower Jenesei. Dresser (1871–81) describes an egg said to have come from Tolstoi Mir on the Jenesei. In Transbaikalia it is an abundant species (Radde, 1863; Dybowski and Parrex, 1868; Lonnberg, 1909). Maak (1859) found it on the Chilka River and at Nerchinsk, but farther north it was rare on the lower Wiljui. Pawlowski also saw specimens on the Wiljui (*fide* Taczanowski, 1893), but it does not appear that the species goes farther north than about 65° north latitude to breed (Buturlin, 1908). Bunge and Toll (1887) obtained a specimen at Werchojansk, but were told that it was rare so far north. So far as I know this is the northernmost record. Farther east specimens were taken at Gichiga (J. A. Allen, 1905) and in Kamchatka, where the species is a regular but not common summer visitor (Stejneger, 1885). Stejneger thinks it may possibly breed on Bering Island, where specimens have been seen on passage. Hartert (1920) has recorded a number of specimens taken on the Commander Islands in April and May. The United States National Museum possesses a specimen from Copper Island, and recently the species has been included in the list of North American birds on the strength of a specimen taken on St. George's Island, Pribilov group, on April 18, 1917 (Hanna, 1920).

Siberia

Kamchatka

Pribilov Islands

In eastern Asia the Falcated Teal is evidently most abundant as a breeder in the Stanowoi Mountains and along the course of the Amur (A. von Middendorff, 1853; Radde, 1863; von Schrenck, 1859). Various observers have found it on Saghalin Island, where it undoubtedly breeds (Taczanowski, 1893; Lönnberg, 1908; Hesse, 1915). It occurs also on the Kurile Islands and on Yezo (Lönnberg, 1908) but I am unable to say whether or not it breeds there. On the mainland it nests throughout the Ussuri Province, particularly at Lake Chanka (Prjevalski, 1878). The Vettor Pisani Expedition took a specimen in immature plumage not far from Vladivostok. Whether or not the species nests in Manchuria seems to be an open question. Ingram (1909) met with it in the Chingan Mountains in June, and Baker (1908) claims to have notes of its nesting in Manchuria. Hume and Marshall (1879) state that it breeds in eastern Mongolia, their authority probably being Prjevalski (1878) who says some occasionally nest in the Ordos region of the Hoang-ho. Such occurrences must, I think, be very exceptional, since even in Korea the species is not known to breed (Taczanowski, 1893).

Japan

Mongolia

In winter the Falcated Teal is common throughout the Japanese archipelago (Blakiston and Pryer, 1882; Seebohm, 1890) from Yezo south. The American Museum of Natural History has a number of specimens collected in southeastern Korea in January, and it is common in Hupeh in winter (La Touche, 1922). It is equally well known and widely distributed in China, whence it has been recorded for Peking (David and Oustalet, 1877; Walton, 1903), Kiau-chow (Kleinschmidt, 1913), Shanghai (Wade, 1895), Chin-kiang and Nanking (La Touche, 1913), Kiu-kiang (Styan, 1891) and Foochow and Swatow (La Touche, 1892; Kellogg, 1919). R. Swinhoe (1863), Uchida (1912) and others have recorded its presence in Formosa. Its status in western China is very uncertain; but it is now quite clear that it winters regularly to some extent

Japan

China

in upper Burma and in northeastern and even north-central India. The first record for this region is, I believe, that of J. Anderson (1878) who reported specimens taken by the Yunnan Mission at Tamilone, on the Taipeng River in upper Burma, February, 1875. Shortly after, Hume and Marshall (1879) recorded five specimens, of which two were from the Lucknow region, two from the district about Delhi, and one from the Calcutta Market. Finn (1909) and Baker (1908) have shown

Burma

that the species is present in northeastern India and Burma in greater numbers than is generally supposed. Specimens have been taken near Bhamo and Kindat in upper Burma, twice in Manipur, and once near Kyaukpyu, Arakan. Several have been shot in Assam and Tirhut, and during the winters from 1898–1902 the species was sometimes quite common in the

India

Calcutta Market. Other specimens have been recorded from Bhawalpur, Jessore, and even the Narra Valley, Sind (Baker, 1908; Finn, 1909; Hopwood, 1912). It is impossible to determine at present the western limit of this bird's range. A specimen was taken by the Afghan Delimitation Commission at Bala-Morghab, Badghis, and the species is said by Zarudny

Persia

(1911) to winter rarely in Persia (Parapamis Mountains, Seistan and Kuhistan-Kirman) and in northern Baluchistan! A male was shot at Hanna on the Euphrates River in March, 1916 (Ticehurst, Buxton and Cheesman, 1922).

There are also several records of its occurrence in Europe. Specimens have been taken in

Europe

Sweden (Dresser, 1871–81) and in Hungary (Dresser, 1871–81), as well as in Bohemia (Fritsch, 1872) and possibly in England, if any weight is to be given a remark made by Pallas (1831).

Migration

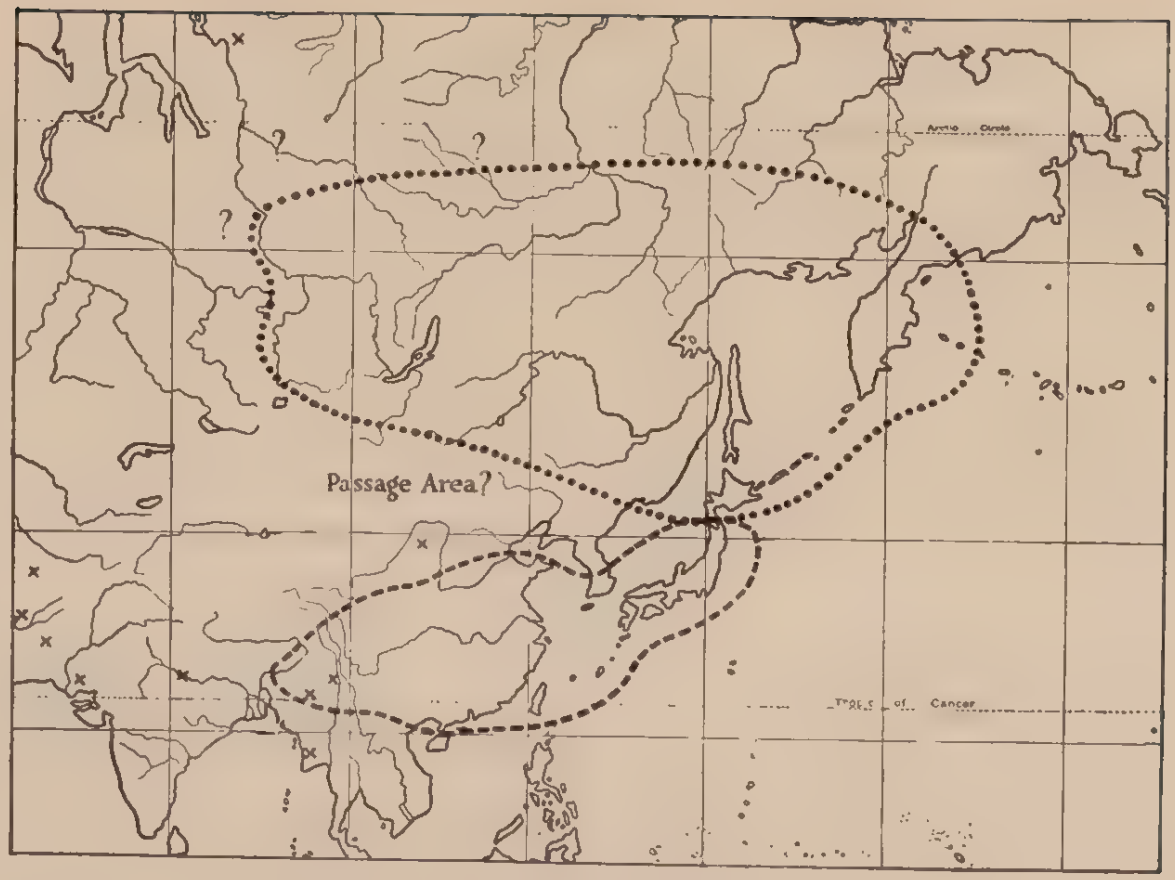
Very little information and few dates are available for a study of the migration of these ducks. According to Dybowski and Parrex (1868) they arrive in Dauria in April. Prjevalski (1878) states that they appear at Lake Hanka from the middle of March to the middle of April, at which latter date Radde (1863) saw them arrive on the middle Amur. They appeared at Utskoi-Ostrog on May 3 (A. von Middendorff, 1853) and at Nikolaievsk on May 18 (von Schrenck, 1859). On the upper Amur they did not appear until early June. In autumn they leave early, disappearing from the Amur region evidently in late September and early October. Radde (1863) says he found none in the market of Irkutsk after September 17. According to Dybowski and Parrex (1868) some stay in Dauria till late December! It is an interesting fact that of the specimens taken in Burma and India a great majority are females (Finn, 1909).

GENERAL HABITS

Haunts. This rather peculiar duck, which may be thought of as related both to the Common Teal (*Anas crecca*) and to the Gadwall (*Anas strepera*) has been given very little space in the literature. It is therefore difficult to make any general comparison of its habits with those of other northern migrants. The great breeding area seems to be in Transbaikalia and along the course of the Amur.

Wariness. Judging by the specimens which I myself have kept I should say that these ducks are very shy and secretive, for when first placed on an enclosed pond they refuse to come near the water, are seldom seen and hide throughout the entire day.

Gait, Swimming, Diving, Flight. The Falcated Teal lacks much of the ele-



MAP 41. Distribution of Falcated Teal (*Anas falcata*)

Breeding range, dotted line; winter range, broken line
Sporadic records indicated by crosses (×)

gance of the true Teal or the Mallard. It appears short, chunky and large-headed for a surface-feeding duck. The long sickle-shaped tertials and short tail give the body a very stumpy appearance. Heinroth (1911) says that a male in the Berlin Gardens always kept his head and neck well drawn in, so that the mane lay on the upper part of his back. The writer never saw these crest-feathers lifted, and the impression created was more like that of a diving duck.

There are no recorded observations as to the flight, except that it is said to be swift and Teal-like which probably means that it is more erratic than that of the Mallard. In Assam it appears singly or in pairs, more rarely in small parties. But in northern China, Prjevalski (1878) speaks of their arriving on spring migration in large numbers and associating very commonly with other species of ducks.

Voice. The voice of the male is a short low trilling whistle (Walton, 1903) or, according to Prjevalski (1878), a "tolerably loud and piercing whistle." Although I have only once or twice heard the note myself I agree with Heinroth (1911) that it is decidedly Teal-like. The note of the female is the typical Mallard-like *quack*, said to be five times repeated (Finn, 1915).

The trachea of the male is about 180 mm. long, and at its bifurcation carries a *bulla ossea* which is roughly spherical in shape and faces to the left and forward. It measures 23 mm. in longest diameter and 16 mm. in shortest diameter.

Food. There are no detailed notes available, but the food seems to be largely of a vegetable nature (Stejneger, 1885; Radde, 1863).

Courtship and Nesting. The time of breeding, so far as one can judge, is not particularly early. They are said to nest early in June in Transbaikalia (Taczanowski, 1873) and in eastern Siberia they begin to nest in late May (Taczanowski, 1893) continuing through June and perhaps into July (Baker, 1908). In captivity they nest very late indeed; in Mr. Hugh Wormald's collection later than any other duck except the Ring-necked Teal. June 1 was his earliest date.

The display as observed in captivity was first noticed by Finn (1915a). He described it as essentially like that of typical ducks, but the erection of the long crest made the head look enormous. He continues: "There was the same rear-up, with the head bent down, followed by an up-jerk of the hind parts; the long sickle-shaped tertials, so noticeable in this species, seemed little if at all expanded, and were not so prominent in the display as one would have expected from their abnormal character. But what especially attracted my attention, as I had noted the display of the male of this duck some time before, was that the females displayed simultaneously with the males, and with the same gestures."

Mr. McLean of East Dereham told me that the display reminded him very much of the Gadwall's, with the same up-and-back head throw.

The nest, so far as known, is always on the ground, in swamps and along the low-lying banks of the larger rivers. It is rather well built, of leaves, grass or rushes, compactly put together and lined with a very heavy complement of down. It is said to be not particularly well hidden, but hard to get at on account of the treacherous nature of the ground (Taczanowski, 1873; Baker, 1908).

The eggs are from six to nine in number, probably averaging eight. They are smaller than the Mallard's and are colored like those of the Gadwall, although the yellow tinge is somewhat more pronounced (Taczanowski, 1893). The average of twenty-one eggs measured by Jourdain was 56.2 by 39.65 mm., the maximum 58.5 by 39 mm. and 55 by 41.5 mm., the minimum 53 by 41 mm. and 57 by 38 mm. (Hartert, 1920). The length of the incubation period is twenty-four to twenty-five days under artificial conditions (Wormald). Baker (1908) seems to think that the drake assists, at least occasionally, in the duties of incubation, but I hesitate in attributing such habits to the males of any palæarctic duck. Baker also says that the male is seldom found far from the nest.

Food Value. Excellent for the table, according to Walton (1903).

Hunt. Even to this day these birds are probably little disturbed over the greater part of the breeding area. But along the coasts of Japan and southern China they are undoubtedly hunted on an increasingly large scale. Great numbers were killed in the Peking region over forty years ago, especially in spring (David and Oustalet, 1877), and more recently a great many have been shipped from Hankow to the markets of Europe (Ghidini, 1911).

Behavior in Captivity. A live specimen of the Falcated Teal was imported and kept by Latham in England before 1785 (Latham, 1785) but the bird has never been common in collections until within thirty or forty years. The London Gardens received some eight specimens of both sexes in 1874 (P. L. Sclater, 1880, 1883) but they never bred there. The average longevity of these eight birds and one received in 1892 was only eighteen months, the maximum being fifty months (P. C. Mitchell, 1911). In England the species has been bred by a few of the more expert aviculturalists, and Mr. St. Quintin was the first of these. Earl Grey of Falloden has been kind enough to write me of his experiences with this species. Some years ago he bought a pair of adult birds which never became tame, were seldom seen or heard, and never bred. He considered them the "dullest, most uninteresting water-fowl" he had ever kept. I quote from his letter:

"In 1917, in the early autumn, a pair of young Falcated Teal, reared by Mr. St. Quintin in Yorkshire, were given me. For some weeks they were very shy and I could only see them occasionally late in the evening. Gradually they got very tame and came regularly to feed both on land and on water. In January, 1918, the drake was

very noisy and it was very interesting to watch him and listen to him. He had two separate whistles, each frequently uttered, but each very distinct; each of these whistles had its own particular gesture, each gesture very pronounced, even ludicrous in appearance, but very distinct. Besides these I heard two other separate whistles, one without any gesture, but these were not frequent and the courting display I considered to consist of the two separate whistles and attitudes first described. The drake kept up this courting display till I left home in March and no doubt continued it after that. The duck was very quiet and unresponsive and there was no nest in 1918.

"In January, 1919, the conduct of the drake was the same, but the duck was clamorous and made loud harsh noises. She nested in the spring and reared four birds, two drakes and two ducks.

"In January, 1920, all three drakes were noisy and demonstrative, but only the old duck was so. The two young ducks were quiet as their mother had been the first year. The old duck either nested very late or had her first nest destroyed and nested again, for it was not until late in July that she appeared on the water with a brood, of which only one, a duck, was reared. The two young ducks did not nest in 1920.

"In January, 1921, the same courting display began, but this time all three ducks were noisy and demonstrative. At this time for some weeks the three pairs of Falcated Ducks were the most noisy and amusing birds on the ponds; and being very tame the courting display could be watched as near as two or three yards distance; indeed the appearance of a spectator seemed sometimes to start a display. The youngest female, that reared in 1920, took no part or interest in the proceedings.

"At the moment of writing, June 12, 1921, no brood of Falcated has yet appeared, but certainly one and probably more than one, of the ducks has a nest."

W. H. St. Quintin (1917) describes one of his females who laid five eggs in June, 1916. The nest was disturbed and three of the eggs broken, but the remaining two were placed under a hen, apparently on June 12, and were hatched on July 3. Others were reared on the same estate in the summer of 1918, and were allowed to grow their wings and escape (London Field, vol. 133, p. 12, 1919). Mr. Blaauw tells me he has never bred this duck and it has never been reared in the London Gardens. At Kew Gardens a male crossed with a female Gadwall (*Anas strepera*) and produced young (Finn, 1917).

In this country the species was very rarely brought over until about the year 1909, when I saw ten or fifteen pairs in the yards of a dealer, G. D. Tilley, of Darien, Connecticut. If I remember correctly, these were offered at about $35.00 or $40.00 the pair. Of late years more have been imported through the markets of San Francisco, so that the price has not been exorbitant. Some that I purchased in the spring of 1921 were only $15.00 per pair. The New York Gardens obtained them during and before the War for about the same figure. In the years 1919–20 thirty

arrived at California from the Orient, according to figures in the U.S. Biological Survey records.

I do not think that Falcated Teal have ever bred in America. They seem to be what one might call "soft" in captivity and those I received from California arrived in wretched condition, although Formosan Teal (*Anas formosa*) in the same crate, were fat and in good feather. Most of my birds died within the first few weeks so that I had no opportunity to make observations upon them or to record their display or voice. They were silent and kept so carefully concealed that they never came on to the water except at night. Certainly wild specimens are among the most peculiar ducks in this respect. Finn (1915) also found them quiet and uninteresting birds for the aviary, but hand-reared stock behaves in a more satisfactory manner, as I saw for myself in Hugh Wormald's collection at East Dereham, Norfolk.

Hybrids. A wild hybrid between this species and *Casarca ferruginea* was taken near Vladivostok (Suchetet, 1896). H. C. Robinson (1918) describes a duck shot in Assam which he believes to be a hybrid between this species and the Gadwall. Mr. N. Kuroda (*in litt.*) has captured three crosses or hybrids between this and the European Widgeon, in his decoy-pond at Haneda, near Tokio, Japan, between 1907 and 1922 (see Tori, vol. 3, pl. 5, 1923). Gadwall hybrids were produced in captivity in Kew Gardens, England, as mentioned above.

WIDGEON

ANAS PENELOPE LINNÉ

(Plate 29)

SYNONYMY

Anas penelope Linné, Systema Naturæ, ed. 10, vol. 1, p. 126, 1758.
Anas cogolca S. G. Gmelin, Reise durch Russland, vol. 1, p. 70, 1770.
Anas kogolca S. G. Gmelin, Nov. Comm. Petrop., vol. 15, p. 468, 1771.
?*Anas melanura* Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 2, p. 516, 1788.
Anas fistularis Brehm (*ex* Brisson), Oken's Isis, 1830, col. 997.
Mareca fistularis Stephens, General Zool., vol. 12, pt. 2, p. 131, 1824.
?*Mareca melanura* Stephens, General Zool., vol. 12, pt. 2, p. 134, 1824.
Penelops penelops Kaup, Natürl. Syst., p. 31, 1829.
Anas kagolca Brehm, Oken's Isis, 1830, col. 997.
Mareca penelope Selby, British Ornith., vol. 2, p. 324, 1833.
Mareca kagolka Brehm, Naumannia, 1855, p. 297.
Mareca fistulans Brehm, Naumannia, 1855, p. 297.

VERNACULAR NAMES

English: Wigeon (male in old English), Whewer (female in old English), European Widgeon, Whim, Whistler, Half Duck, Smee Duck, Easterlings, Red-headed Widgeon, Yellow-poll.

French: Canard siffleur, Marèque siffleur, Sarcelle double, Siffleur pénélope, Vingéon, Vignon, Wuiot, Oignard, Rougeot.

German: Pfeifente, Mittelente, Blässente, Rotente, Rothals, Speckente, Schmüente, Weissstirn, Braunente, Doppelkricke, Grasente.

Gaelic: Glas-lach, Lacha lachlannach.

Dutch: Smient, Fluiteend, Smink.

Danish: Pibeand, Blisand, Lysand, Brunnakke, Blyand.

Swedish: Bläsand, Brunnacke, Bläsa, Hvitback.

Norwegian: Brunnake, Pipand, Graesand, Lyngand.

Faroes: Andt.

Icelandic: Raudhöfda-önd, Raudhöfda-gráönd, Rauddufu-önd.

Finnish: Haapana, Viurus uorsa, Kirnulintu.

Lapplandish: Snartal.

Lettish: Schwukschkis.

Esthonian: Murulas.

Russian: Swijas, Swestund, Glott.

Polish: Kaczka swistun.

Croatian: Patka zvizdara.

Czech: Kachna hvizdak.

Hungarian: Fütyülö recze, Sipos recze.

Bulgarian: Swiratshka, Puwka.

Italian: Fishione, Morigiana, Bibbio, Penelope, Fistione, Capo-rosso.

Sardinian: Busciu.

Maltese: Silfiun.

Spanish: Anade silbador, Piulo, Pato franciscano, Silbon, Pato florentino, Pato careto.

Basque: Christulari-ata.

Portuguese: Assobiadeira, Piadeira, Alfanado, Sarafanada.

Arabic: Fela bajh.

Hindu: Peasan, Patari, Pharia.

Ostiak: Lopte.

Tartar: Bojul.

Japanese: Hidorigamo.

DESCRIPTION

Adult Male: Forehead and crown light buff, rest of head and neck dark burnt-sienna color, minutely speckled here and there with black, and behind the eye and on occiput with iridescent green. Chin, throat and lower side of neck more or less black, sometimes entirely so, but this varies greatly. Mantle, back, and scapulars finely vermiculated with wavy black and white bars. Ends of upper tail-coverts nearly white. Tail slate-colored, the central feathers long and pointed. Breast vinaceous, often with a few small blackish bars, this wine color extending farther on the sides than in middle of breast. Remainder of under surface pure white, except the sides and flanks which are vermiculated like the scapulars. Under tail-coverts jet black. Wing-coverts white, except a few at the angle of the wing, which are gray, and a black band at the tip of the greater ones. Speculum on the secondaries metallic green, bounded posteriorly by a black band. The inner secondaries are white on the outer web. Tertials rather long; black on their outer webs, with a white margin. Primaries brown; under wing-coverts gray; axillars white, thickly speckled with gray, especially on inner web.

Irides dark brown. Bill bright slate-blue, with the tip black. Legs and feet yellowish brown to bluish; webs dusky. There is a good deal of variation in the color of the legs.

Wing 254–266 mm.; bill 33–38; tarsus 37–41.

Weight from 1 pound 12 ounces to 2 pounds (0.8 to 0.95 kilograms); probably a trifle heavier at times.

Adult Female: Whole head and neck a ruddy brown, or brown ochre, thickly dotted with blackish. Upper parts brown. The mantle is a gray brown, sometimes nearly plain-colored but often with lighter cross-bars. The edges of the scapulars are ruddy brown and the long ones are tipped with

WIDGEON

Female

Male

AMERICAN WIDGEON

Male

CHILIAN WIDGEON

white. Breast of nearly same color as head, very indistinctly banded with blackish; flanks reddish brown. Rest of lower surface pure white. Under tail-coverts white, with some black bars. Wing-coverts gray, tipped with white. Speculum black, rump gray, tail dark brown. Under wing-coverts and axillars as in male. The bright rusty-colored head fades by the spring so that it may become almost, if not quite as gray as in the American Widgeon. Some birds, apparently young of the year, have very gray heads.

Iris dark brown. Bill slate-blue. Legs and feet as in male.

Wing 232–245 mm.; bill 31–34; tarsus 37–40.

Weight: almost half a pound (0.22 kilograms) lighter than the male.

Female in First (Juvenal) Plumage: Very closely resembles adult female, but the tail-feathers are shorter and blunter at the tips. I am not sure that I can always tell the young from the adult female by plumage alone, but Lord Percy tells me that he can tell young specimens by their "plainer" appearance, and by the difference in the outer wing-coverts.

Young Male in First Plumage: Similar to young female but a few more or less vermiculated feathers soon begin to appear on the mantle, together with some green on the speculum. Before vermiculation is apparent, the differences are very subtle. Lord Percy, who has bred many and handled them at the age of seven weeks, says he had no difficulty in picking out the sexes. The characters he used were size, a richer color of the browns in the males, and characteristic light-colored bars on the mantle feathers of males. To the ordinary observer the sexes would probably appear identical at so early an age.

Young Male in First Winter: Wing-coverts gray. The complete white wing patch never assumed until spring, and not always until later than that.

Male in Eclipse: In general appearance like the adult female, but the black markings on the cheeks, chin and throat are apt to be more accentuated. The flanks are much richer in color than those of the female, as are also the mantle and the scapular region. Vermiculated feathers may still be present on the mantle or among the scapulars. The white wing patch is the same as in the winter plumage.

Downy Young: Differs from the young of the Mallard in the complete absence of an orbital stripe, and the much darker, almost jet black, of the upper surface, particularly the top of the head and the back. The sides of the head are more rufous, and not so yellow as in the Mallard, and the wing patch is brown instead of yellowish. The rump and scapular patches are certainly smaller than in the Mallard, but they are not absent. The head and bill are smaller than in the young Mallard. Compared to the American Widgeon these downy young are darker and grayer above and rather whiter below while the sides of the head are more rust-colored and less yellowish. I am not sure that these characters would hold in every case for the down color of young ducks is rather variable.

DISTRIBUTION

Breeding Range

The Widgeon is a far-northern breeder and a far-southern winterer, and is consequently found throughout a wide latitude in the Old, and to some extent also in the New World. The species breeds north to 71° north latitude or even farther, and southward to 45° or even 42° though only occasionally south of 60°, excepting in eastern Europe and western Siberia.

Iceland
Faroes
Shetlands
British Isles

In Iceland it is a not rare breeder (Hantzsch, 1905; Millais, 1902), but only a few breed on the Faroes (Müller, *fide* Millais, 1902). Saxby (1874) some time ago recorded numerous instances of its breeding on the Shetlands, but the only recent record is for 1897 (Baxter and Rintoul, 1920a). In the British Isles it is not known to have bred in Ireland, but very likely does so in some of the northern counties, where young have been taken (Ussher and Warren, 1900). In Scotland it is increasing as a breeder, and has been recorded as nesting successively in the Orkneys, in Sutherland abundantly, in Inverness, Cromarty, Ross, Caithness, Perth, Kinross, Dumfries, commonly in Selkirk, in Moray, Kincardine, Argyll and Roxburgh (Baxter and Rintoul, 1920a). In England it has nested only very exceptionally. Stonham (1908) says it has bred in East York, Cheshire, Norfolk and Sussex, and Baxter and Rintoul (1920a) state that it has nested in Cumberland also. According to the British Ornithologists' Union Checklist (1915) it breeds occasionally in northern England and also in Wales. On the Continent the species has been variously reported as breeding in about every country, but all records in western Europe south of 57° are to be regarded as unusual. Such are those for Holland (Schlegel, 1859; de Vries, Ardea, vol. 10, p. 33, 1921), and for France, where the species occasionally nests in the swamps according to Degland (1849), and in Franche-Comté (Ternier and Masse, 1907). D'Hamonville (1895) says a few breed in Lorraine, apparently regularly, but this statement seems questionable. It has even been reported nesting in the Camargue (J. von Müller, 1856). In Italy the species evidently nests not so very rarely in the Province of Venice, as has been variously reported by many authors, most reliably by Giglioli's (1886) correspondents, as well as by Arrigoni degli Oddi (1898) and Picchi (1904). There seems to be no doubt of its having bred a few times at Pavia and at Piacenza, as Giglioli (1889–91) reports on the testimony of Arrigoni degli Oddi, and also at Massarosa, Tuscany (Gragnani, reported by Giglioli, 1889). The species may have bred even in northern Sardinia at Sorso, Sassari, if we can believe Bonomi (reported by Giglioli, 1889) and Picchi (1898). But even taking this into consideration it is difficult to credit Loche's (1867) statement that it breeds in Algeria! Farther north it breeds rarely in Germany, in the Provinces of Mecklenburg (Dahl, 1905; Wüstnei, 1898), the island of Rügen (von Homeyer, *fide* Naumann, 1896–1905), Oldenburg (von Negelein, 1853), Westphalia (Altum, 1830), Brunswick (R. Blasius, 1896), Lusatia (Tobias, 1853), Silesia (Flöricke, 1891; Kollibay, 1906) and eastern Prussia (Hartert, 1892). It nests most commonly in eastern Prussia (Flöricke, 1898) and may possibly breed in Bavaria (Naumann, 1896–1905). In Bohemia it breeds sparingly (Fritsch, 1872) and is said to breed also on the Danubian Islands of lower Austria (Frauenfeld, *fide* Naumann, 1896–1905), while in Hungary it has bred at Vilagos, Arad Comitat (Madarász, 1884) and on the Neusiedler Lake (*fide* Naumann, 1896–1905). Seebohm (1885) says he took eggs on the lower Danube, but he gives no specific locality; very likely he refers to Transylvania. Sintenis (1877) found the species on Lake Sinoe, Danube delta, in May, and it may have been breeding there. Passing north to the regular breeding range I find that the species nests occasionally in Denmark, in northern Seeland (Kjärbölling, 1850), rarely in southern Norway, but commonly in the north, becoming abundant on the Lapland frontier (Schaanning, 1913; Collett, 1873), specifically on the Lofotens and Vesteraalen (Boie, 1869), in Tromsö (Hartwig, 1889), on south Varanger (H. J. Pearson, 1904). In Sweden, according to Wallengren (1853), it breeds rarely south as far as Smaland, more commonly in the mountainous provinces of western middle Sweden, as in Bohus and Werm, but rarely in eastern middle Sweden (Uppland). It becomes gradually more common farther north until in Lapland it appears to be the most abundant breeder, north to Utsjoki and even the Arctic Ocean, in south Varanger (Palmén, 1876). In Lapponia Enontekiensis it is very common (Suomalainen, 1908) and also in southwestern Lapland (Palmén, 1876). Various other writers have recorded it for Lapland, Pearson (1904) specifically for the Russian districts. It is the commonest breeding duck in western Lapland (Finnilä, 1913, 1914; Montell, 1917). On the Kola Peninsula it was found by

Holland
France
Italy
Algeria
Germany
Austria
Hungary
Baltic Lands

MAP 42. Distribut

Breeding range, do

Sporadic rec

on (*Anas penelope*)
range, broken line
crosses (×)

numerous travelers quoted by Pleske (1886), but it apparently is more common inland than on the coasts (A. T. von Middendorff, 1853). On the White Sea, Sahlberg and Malmberg (*fide* Pleske, 1886) found it at Kandalaksk, at the head of the bay of the same name, and throughout eastern Finland south through Karelia to the Ladoga region. In southwestern Finland the species breeds quite rarely but becomes common in the central and northern parts (Suomalainen, 1908). But Palmgren (1913) speaks of it as a common breeding bird about Helsingfors. Dresser (1871–81) says he found it about everywhere in Finland and Palmén's (1876) statement amounts to the same thing, acknowledging, of course, its comparative scarcity in the southwest. Because of inadequate information it is quite impossible to determine with any great degree of accuracy the southern limit of the breeding range in Russia. It is certainly very abundant in the northernmost parts, throughout the whole White Sea region, the Archangel Government, the Lower Petchora and eastward to the Urals, becoming ever more common toward the east (Harvie-Brown, 1876). In this region it has been specifically recorded for the Karelian coast (Rae, 1881), Archangel (Goebel, 1871; Liljeborg, 1852; Seebohm, 1882; Alston and Harvie-Brown, 1873; etc.), and the lower Petchora (Harvie-Brown, 1876). On the Arctic Sea the species has been found on the Kolguev Island in the middle of June (Trevor-Battye, 1895), in Ljamtschina Gulf, Vaigach Island (von Heuglin, 1872) and in Sassen Bay, western Spitzbergen (König, 1908). Jourdain (1922) recorded it for Bear Isle and Spitzbergen but found no nests. Passing southward in Russia, the status of the species in the vicinity of Petrograd is very uncertain. According to Sievers (1877) it is a common breeder in Olonez Government about Ladoga and Onega, and this seems likely when we consider how commonly the species breeds in southeastern Finland. Brandt (1880) says it is numerous about Petrograd in summer, but Büchner (1885) proceeds to show that these are flocks consisting of males only and that to his knowledge the species does not breed at Petrograd. Personally I believe Deditius (1885) is correct in saying that not many breed there; some certainly must, for the species breeds rarely at Novgorod, and Goebel (1871) says he saw it on the Volga below Tver in summer. According to Loudon (1909) the species is found throughout the summer in all the Baltic Provinces, but these are very likely flocks of males, such as occur also in Poland in summer (Taczanowski, 1888). Eastward of the Baltic the breeding range apparently extends farther and farther south, the birds nesting in the north in Vologda (Goebel, 1871; Mejakoff, 1856) and in the Perm Government rarely at Ekaterinburg but commonly in the southeastern part, and particularly about Shadrinsk. Hoffman has recorded it for the Urals, 62° north latitude (Harvie-Brown, 1878). Farther south it breeds over a very extended area, commonly in Moscow (Menzbier, 1881; Lorenz, 1892) and in Tula (Menzbier, 1881; Harvie-Brown, 1878) and even in Tambow (Harvie-Brown, 1878). Farther east it breeds in Kazan (Russki, 1893). Bogdanow (*fide* Dresser, 1871–81) says it breeds in the black-earth districts of the Volga, and Moeschler (1853) states that it is very common from March to October and breeds about Sarepta, on the lower Volga. This seems not incredible when we turn to the breeding range in Asia.

Russia

In the Kirgis the Widgeon seems to be a regular breeder (Nazarow, 1887; Suschkin, 1914) and this is very likely its most southern breeding ground. In western Siberia it was found in Akmolinsk in June (Bianchi, 1902) and undoubtedly breeds in the whole region about the Tobol, Ischim, Irtysch and Ob Rivers, and north of a line drawn from Sarepta, on the lower Volga, to the northern shore of Lake Balkasch or the Tarbagatai Mountains. In the district north and east of Lake Balkasch the species was found by Finsch (1879) on the Ala-kul in early May, on the Marka-kul in June, and all along the Ob River, where he says it was the commonest non-diving duck. On the upper Irtysch he met with it at Buchtarminsk in the middle of June, and concerning this same region Suschkin (1913) says it breeds at Minussinsk, on the upper Jenesei, and on the northern slopes of the Tannu Mountains, in the Russian Altai, in the Saissan-nor lowland, as well as in southwestern Siberia. Ushakov (1913) speaks of it as a common breeder in Tobolsk Government. Farther north Finsch (1879) was told by Slovzoff that it was common on Lake Chany,

Asia
Siberia

while he himself found it very common along the course of the lower Ob, meeting with it at Obdorsk in July; and on the Shchucha River, a confluent of the lower Ob, in August. Eastward Popham (1897) found it an abundant breeder on the Jenesei north of Jeneseisk, and it is similarly reported for the Jenesei by Seebohm (1879), Suschkin (1913) and Haviland (1915). Palmén (1887) states that it extends north to 70° 30′ on the Jenesei. Eastward it was found breeding on the Boganida, a tributary of the Cheta, in 71° north latitude by A. T. von Middendorff (1853), and farther south on the Wiljui River, a large confluent of the Lena, it was found by Pawlowski (*fide* Taczanowski, 1893). Between the Jenesei and the Lena, the species apparently nests everywhere south to the northern boundary of Mongolia. Radde (1863) found it breeding on the northern Angara River, in Irkutsk; Suschkin (1912) states that it breeds in the Baikal region and in Mongolia. Radde (1863) met with it in the eastern Sajan Mountains in late May, and I believe it very probably breeds to some degree not only there, but also in Transbaikalia, although Taczanowski (1874) says it is a bird of passage there. The status of the species in the region east of Lake Baikal is very vague. Père David (David and Oustalet, 1877) is quite confident that it breeds in "Mongolia" (presumably the southeastern part). Prjevalski (1878) says some breed on Lake Hanka. Von Schrenck (1859) states that it is common everywhere on the Amur to its mouth, but since most of his dates are for autumn it is more than likely that he means on passage. He believes, however, that eggs which he took at Mariinsk, on the lower Amur, belong to this species. There is no evidence that this duck has ever bred on Saghalin Island, but Borrissow (*fide* Hesse, 1915) shot it there at Hagdusa in early May, and it may very likely breed in the northern part of the island. North of the Amur Government, A. T. von Middendorff (1853) found it breeding at Angminsk but says he did not meet with it east of the Stanowoi Mountains. Still farther north Bunge and Toll (1887) found it breeding at Werchojansk, on the Jana River, and also on the Adytscha River, a tributary of the Jana. According to Palmén (1887) it extends north to 71° 20′ on the Jana. Eastward Thayer and Bangs (1914) record it as common at Nijni Kolimsk, at the mouth of the Kolyma; and at Gichiga, at the head of Gichiga Bay, Ochotsk Sea, it breeds, though not commonly (J. A. Allen, 1905). However, it is said to nest commonly at Marsova, on the Anadyr River (J. A. Allen, 1905) and Bianchi (1908) states that specimens have been taken on the Maina River, in the Anadyr Basin, on May 29 and June 22. Nelson (1883) did not find it on the extreme eastern Arctic coast, but says he believes it must breed on the Aleutians. There is no adequate proof, however. Elliott (1882), who found it on the Pribilov Islands, says it never occurs in pairs, and the specimens met with are evidently stragglers. Dall (1873) says it is not uncommon in winter on Unalaska, but migrates about May 1. I am unable to explain this statement; there is no other information of its having occurred on the Aleutians. It is a numerous but irregular visitor on the Commander Islands, but has never been known to breed (Stejneger, 1885; Bianchi, 1909; Hartert, 1920). The species has been many times recorded from Kamchatka (von Ditmar, 1900; Stejneger, 1885; Bianchi, 1909a) where it is evidently common in spring. I know of one record of its having bred (Kuroda, *in litt.*), while Bianchi (1909a) says it was found between June 25 and July 8 on Nerpech Lake (presumably in the northern part) where it probably breeds.

Winter Range

In winter the European Widgeon is found sparingly on the Shetlands (Saxby, 1874; Evans and Buckley, 1899) but not on the Faroes, although Hantzsch (1905) thinks it more than likely that some spend the winter in Iceland. In the British Isles it is abundant in the cold season, especially on the coasts of Scotland (G. R. Gray, 1871; Baxter and Rintoul, 1920a) and on the east and southeast coasts of England (Dresser, 1871–81; Seebohm, 1885; Millais, 1902; Stonham, 1908; etc.). In Ireland it is abundant (W. Thompson, 1851; Payne-Gallwey, 1882; Ussher and Warren, 1900). Concerning the Continent Collett (1871) says it is very common on the coasts of Norway, evidently meaning only

Shetlands
Faroes
Iceland
Scotland
England
Ireland
Norway

the southwestern and southern parts as stated by Schaanning (1913). Dresser (1871–81) states that considerable numbers spend the winter in southern Sweden, but there seems to be some question about this. In Denmark it is abundant in winter (Kjärbölling, 1850), while in Germany it rarely winters except in certain localities: commonly in Schleswig-Holstein (Rohweder, *fide* Naumann, 1896–1905), in Brunswick (R. Blasius, 1896), not rarely at Neuwied (Brahts, 1855), sparingly in the Rhine Provinces (LeRoi, 1906–07). Naumann (1896–1905) states that it most probably winters occasionally in Bavaria, Würtemberg and Baden, while Flöricke (1898) claims to have seen specimens in eastern Prussia in winter. The species is common in Holland as well as in Belgium (Schlegel, 1859; Dubois, 1886; Raspail, 1913) and on the coasts of France (Seebohm, 1885). Rogeron (1903) states that it winters sparingly in Anjou; the British Museum has a specimen taken at Arcachon in November; H. Saunders (1884) met with it on the Lac de Lourdes in the Pyrenees; Backhouse (1887) states that it is common at Perpignan; Clarke (1898) records it for the Rhone Delta and Provence, and Lilford (1875) procured it at Cannes in midwinter. According to Reyes y Prosper (1886) and Arévalo y Baca (1887) it winters in Spain very commonly in Andalucia and on the coast of Catalonia whence it extends to the central districts. In Granada, Murcia and Galicia the latter says it is less common. It is also a common bird in Portugal (Tait, 1896; A. C. Smith, 1868; Seabra, 1910). From the Balearics it has been reported for Mallorca and Minorca (Barcelon, *fide* Reyes y Prosper, 1886). According to J. Whitehead (1885) it is common in Corsica, and according to Salvadori (1865) and Brooke (1873) abundant in Sardinia. In Sicily it is very common (Malherbe, 1843) and C. A. Wright (1864) states that it is found in winter on Malta, but according to Despott (1917) it is a scarce bird there. In the Italian peninsula it winters, as Giglioli's (1889–91) investigations show, from Sicily through Calabria, Apulia, Campania, the Marches, Tuscany, Liguria, Venice, Lombardy and Piedmont. Fatio (1904) says the species winters sparingly in Switzerland. Althammer (1857) has recorded it as fairly common in the Tyrol, while on the Adriatic coast in Dalmatia it is abundant (Kolombatović, 1903). Crown Prince Rudolph and Brehm (1879) state that it winters about Vienna, and it apparently does so in limited numbers in Hungary (Madarász, 1884) as well as in Transylvania (Danford and Harvie-Brown, 1875). In the Balkans it winters south through Montenegro (Reiser and von Führer, 1896) and Greece, where it is abundant (von der Mühle, 1844; Krüper, 1862; Lindermayer, 1860), specifically on the Cyclades (Erhard, 1858), and on the Ionian Islands and in western Greece (Powys, 1860). Northward it is very common in Macedonia (Elwes and Buckley, 1870), in Bulgaria, and even in Bessarabia (Radakoff, 1879). Dresser (1871–81) states that it winters on the Russian coasts of the Black Sea, but Brauner (1894) says nothing of its wintering in Cherson or the Crimea, and its doing so regularly seems open to doubt, although Radde (1854) states that it winters in the Crimea.

Sweden
Denmark
Germany
Holland
Belgium
France
Spain
Portugal
Corsica
Sardinia
Italy
Switzerland
Balkans
Russia

In western Africa the species is abundant in winter. Ogilvie-Grant (1905) found a specimen from San Miguel, Azores, in the Ponta Delgada Museum and was told that it was not uncommon on these islands. Harcourt (1851) and Hartwig (Ornith. Monatsb., 1894, p. 57) found it in the Madeiras, Meade-Waldo (1893) saw it in the Canaries, and Cabrera y Diaz (1893–94) has two specimens from the same archipelago. Beyond this there are probably very few records (Bannerman, 1919). It has not yet been reported from the Cape Verde group, but it must occur there, if we are to believe de Rochebrune's (1883–85) statement that it is pretty common on the mainland as far south as Senegambia, where it has been taken at Thionk, Leybar, Taalari and Sedhiou. The same author says it occurs in that country on passage at the end of winter, which indicates that the species winters even farther south on the west coast of the continent. Information concerning this part of the world is so meager that it is impossible to decide the question, but de Rochebrune's statements must always be treated cautiously. Farther north it is

Western Africa
Azores
Canaries

abundant in Morocco (Reid, 1885; Drake, 1867; J. I. S. Whitaker, 1905) and in Algeria (Rothschild and Hartert, 1912; Taczanowski, 1870; Loche, 1867; Buvry, 1857) and extends south even to the northern Sahara, where Tristram (1860) found it fairly common. According to König (1888), J. I. S. Whitaker (1905) and Zedlitz (1909) it is common also in Tunis. In fact, it is said to be the commonest duck there, occurring in great flocks as far south as the Sahara (Millet-Horsin, 1912).

Northeastern Africa

In northeastern Africa it is common in the Nile delta, but becomes rare above Cairo (Shelley, 1872; Raw, 1921). Adams (1864) has recorded it for Cairo, and Nicoll (1912) found it on the Natron Lakes. Von Heuglin (1873) states that he found it in Nubia and on the Red Sea at Suakin, while A. L. Butler (1905) reports having met with it several times at Khartum. Rüppell (1845) long since recorded it for Abyssinia, and quite recently it was found to be common in southeastern Abyssinia on Lakes Harrar-Meyer and Gedda (Ogilvie-Grant, 1900). The British Museum possesses a specimen from Aden!

Asia

Turning to Asia I find the species recorded as everywhere common in Palestine (Tristram, 1884), exceedingly plentiful in Cyprus (Bucknill, 1911), and in Asia Minor from Smyrna (Strickland, 1836) and Ismid on the Sea of Marmora (G. C. Taylor, 1872) where it was abundant in late May! From the interior of Asia Minor I find a record of Weigold's (1913) having met with a small flock at Bumbudj on the Euphrates in northern Mesopotamia. The British Museum possesses specimens from Babylon and Bagdad, as well as one recorded by R. B. Sharpe (1891a) from Fao, at the head of the Persian Gulf. Members of the British Expeditionary Force also met with a few in Mesopotamia (Meinertzhagen, 1914; London Field, Dec. 14, 1918). In the Caucasus the species winters pretty commonly at Lenkoran on the Caspian, commonly in the Parapamis, Seistan, Kuhistan and Kirman districts, in the Zagross and Mesopotamian regions and on the littoral of the Persian Gulf and Arabian Sea (Zarudny, 1911). C. Swinhoe (1882) states that it is rather rare in winter in southern Afghanistan, but in the north it has been recorded from Quetta (Meinertzhagen, 1920) and Badghis by R. B. Sharpe (1889), and according to Severtzoff (Dresser, 1876) it winters even in southwestern Turkestan, that is, in the Buchara and Samarkand regions. Carruthers (1910) also states that it winters in the Zarafschan Basin. Eastward its status is not clear, but it very likely winters to some extent in the Himalayas of western Pamir and western Kashmir, being found in the mountains from the latter Province east to Bhutan (Hume and Marshall, 1879). South of the Himalayas in India it is variously reported as common and rare, and Baker (1908) suggests it is probably more common in the dry seasons. I may add that from the information available it seems to be commoner in the western districts and rarer in the east, being, according to Hume and Marshall (1879), of occasional occurrence in the Punjab and Sind, and common in Kathiawar, but less so in Cutch. In Guzerat, Khandesh, Berar and the western part of the Central Provinces in the Konkan and western part of Hyderabad it is not uncommon, as also in the Deccan and in parts of Mysore, but it evidently does not occur south of this. Hartlaub (1854) recorded it from Ceylon, but Legge (1880) makes no mention of either the record or the actual occurrence of the bird, and its presence in the island seems questionable. Hume and Marshall (1879) also state that they have been unable to establish its occurrence in the eastern parts of the Central Provinces or in Chota-Nagpur, but do not doubt its occasional occurrence there.

India

In northern India it appears, "capriciously distributed" from the Punjab through Rajputana, the Northwest Provinces, Behar and parts of Bengal (Hume and Marshall, 1879). It extends farther east than Hume and Marshall (1879) supposed likely, and is common in Cachar and Sylhet, not rare in Goalpara and Kamrup, and occurs throughout Assam as well as in northern Tenasserim (Baker, 1908). Hopwood (1912) recently found a flock of forty at Kyaukpyu, Arakan; while Rippon (1901) states that it is not at all uncommon in the South Shan States, and H. R. Davies (1909) once saw a flock of one hundred on the Chuching River in Yunnan. Eastward it is common in southern China (R. Swinhoe, 1860; David and Oustalet, 1877) but very likely does not winter much north of Yangtse-kiang basin. It has been recorded from northern Hainan (Hartert, 1910),

China

Formosa (Uchida, 1912; R. Swinhoe, 1863), and Hong-kong (Vaughan and Jones, 1913), and is common on the whole Quangtung coast (Kershaw, 1904), and at Swatow and Foochow (La Touche, 1892). Styan (1891) states that it is very abundant on the lower Yangtse River from Hankow to the delta, and it is pretty common at Ningpo. From the interior it has been reported from Kiu-kiang (Seebohm, 1884) and from western Szechwan (Thayer and Bangs, 1912). On the Loo-choo Islands it was found on Tanegashima in November and December (Ogawa, 1905) while in southern Japan it is abundant, even north to Tokio (Blakiston and Pryer, 1882). The Italian expedition even took a specimen at Yamada, on the northeast coast, in November (Giglioli and Salvadori, 1887), but it probably does not winter in the northernmost parts of Nippon. In the Philippine archipelago it has been met with in Calayan (R. C. McGregor, 1909), in Luzon (Worcester, *fide* R. C. McGregor, 1909), on Mindanao (Celestino, *fide* R. C. McGregor, 1909) and on Basilan (R. C. McGregor, 1909). There are two records of its occurrence in northwestern Borneo, namely at Bintulu (Everett, *fide* R. B. Sharpe, 1877) and on the Tampussuk plain where a small flock was seen (R. B. Sharpe, 1890). I find that the British Museum has a specimen taken in October on Chichishima, an island in the Bonin group, southeast of Japan, latitude *circa* 27° north, longitude 142° east. A remarkable record is that given by Finsch (1880) concerning the capture of an exhausted specimen on Taluit Island in the Marshall group. But this record is not quite so striking after the report of the tremendous flights of American ducks over these islands (Reichenow, 1899a), and if the Widgeon should be found to do the same and it should turn out that the birds fly to the Aleutians, it may appear that the species breeds in the Aleutians after all, and that the migrants on the Commander Islands in spring are not from Japan and China, but from the South Sea Islands!

Philippines

Passage Area

The large area lying between the breeding and wintering ranges, as well as the southern and northern parts respectively of the breeding and wintering ranges are regions in which the species is known either wholly or primarily as a bird of passage. This area includes the Faroes, where the birds occur only on passage to and from Iceland and the British Isles. On the Continent it comprises southern Scandinavia (Wallengren, 1854) and Denmark (Kjärbölling, 1850), Holland, Belgium (Dubois, 1912), France (Ternier and Masse, 1907; Paris, 1907), northern Spain, Sardinia (Giglioli, 1889–91) and all but the southernmost parts of Italy (Giglioli, 1886; Arrigoni degli Oddi, 1904), Switzerland (Fatio, 1904), Lorraine (d'Hamonville, 1895), Luxembourg (La Fontaine, 1865–72), Germany, specifically Schleswig-Holstein (Dahl, 1905), Oldenburg (von Negelein, 1853), the Rhine Palatinate (W. and T. Heussler, 1896), the Rhine Provinces (Le Roi, 1906–07), Brunswick (R. Blasius, 1896), Brandenburg (Schalow, 1915), Saxony (Helm, 1905) and eastern Prussia (Hartert, 1892), Poland (Taczanowski, 1888), Bohemia (Fritsch, 1872), Hungary (Madarász, 1884), Transylvania (Danford and Harvie-Brown, 1875), Bulgaria (Reiser, 1894; Radakoff, 1879), the Dobrudja (Sintenis, 1877) and Rumania, as well as the greater part of Russia, specifically Cherson and the Crimea (Brauner, 1894), Kief (Goebel, 1871) and Orel (Daniloff, 1864), Tula and Moscow (Menzbier, 1883), the Baltic Provinces (Loudon, 1909), Novgorod (Bianchi, 1910), Petrograd (Büchner, 1885; Bianchi, 1907) and also extreme southern Finland (Palmén, 1876). Eastward it occurs chiefly on passage in Kazan (Russki, 1893) and in Astracan (Seebohm, 1883) while in Asia this passage area includes the Caucasus (Radde, 1884; Zarudny, 1911), in Persia the Chorassan, Parapamis, Kuhistan and Kirman regions (Zarudny, 1911), Transcaspia (Zarudny, 1889–90), all of Turkestan excepting the southwest (Severtzow, 1883), Ferghana (Stolzmann, 1897), Chamba and Kashmir (Scully, 1876; Biddulph, 1881), northern Tibet and Lob-nor (Koslow, 1899; Deditius, 1886), Kuku-nor (Deditius, 1886), Transbaikal (Dybowski and Parrex, 1868), northern China (David and Oustalet, 1877; K. H. Jones, 1911), Korea (Kalinowski, *fide* Taczanowski, 1893), Lake Hanka (Prjevalski, 1878), Saghalin Island (Nikolski, *fide* Taczanowski, 1893), Yezo (Whitely, 1867; Blakiston and Pryer, 1882), the Kuriles (Stejneger, 1898), presumably Kamchatka (Bianchi, 1909) and the Commander Islands (Stejneger, 1885; Bianchi, 1909).

The status of the European Widgeon in the New World is still undetermined. In addition to a few indefinite early records for Greenland, chiefly for the southern parts, I find two records for Angmagsalik on the east coast given by Helms (1910), who says there are four records in all for the east coast. On the west coast the species was found at Arsuk, December 17, 1900 (Helms, 1904), and the Peary Expedition took a specimen as far north as Holsteinborg, October, 1894 (F. M. Chapman, 1899). In the Schiöler collection there are at least seven specimens from various parts of Greenland (Schiöler, 1912). On the American continent the northernmost eastern record is that recently given by C. W. Townsend (1917), who found a specimen in Mr. Beetz's collection taken at Piashte Bay, southern Labrador, the only record for this Province. Cooke (1906) says it has occurred in Newfoundland. It has been taken in at least twenty-two different States. For the Atlantic coast States there are numerous records. Downs (1888) says it is rare in Nova Scotia and there appears to be only one good record (Piers, 1915). In the New England States it has been found in Maine (Norton, 1913), New Hampshire (Hardy, 1909), doubtfully in Vermont (G. M. Allen, 1909), many times in Massachusetts (Forbush, 1912; Phillips, 1920; etc.), in Rhode Island (Brewster, Auk, 1909, p. 186; G. M. Allen, 1909). I find only one or two records for Connecticut, but several for Long Island (Eaton, 1910), New Jersey (Stone, 1909), Maryland (Kirkwood, 1895), Virginia (Rives, 1890), North Carolina (Pearson, Brimley and Brimley, 1919) and Florida (Fay, 1910). Undoubtedly the species is far more common in North America than has hitherto been supposed, as the recent multiplication of records and my own experience in Massachusetts has shown. Some of the earlier writers (Turnbull, 1869, for example) speak of it as regular in its appearance. There are now numerous records for the interior. It has been reported for New York State (Eaton, 1910), Pennsylvania (Cooke, 1906), Ohio (L. Jones, 1903), Indiana (Deane, 1905; A. W. Butler, 1898), Michigan (H. Herrick, 1902; Barrows, 1912), Illinois (Ridgway, 1895; Cory, 1909), Wisconsin (Kumlien and Hollister, 1903; W. Taylor, 1919), Missouri (Widmann, 1907) and Nebraska (Bruner, Walcott and Swenk, 1905). There are also two records for Wyoming (Grave and Walker, 1913) making, except for Idaho, an unbroken chain of States from the Atlantic to the Pacific, in which the species has been taken. On the Pacific coast the European Widgeon has been found a number of times. There are about ten good records for California (Grinnell, Bryant and Storer, 1918) while in Oregon it has actually been spoken of as a common migrant (Pope, 1895–96)! On the other hand there are very few (apparently only two) records for Washington (Bowles, 1915; Warburton, 1917), and so far as I know only three for British Columbia (Kermode, 1904). Mr. Vernon Bailey (MS.), however, states that Gray took one on Stikine Flats and he believes he has seen others. In the interior of British America specimens were taken by Frank Russell (1898) at Grand Rapids, Lake Winnipeg, and on August 22 at Fort Rae, Great Slave Lake! Neither of Russell's records is included in J. and J. M. Macoun's (1909) catalogue, and they are certainly extraordinary. Nevertheless it is worth recalling that Richardson (*fide* Baird, Brewer and Ridgway, 1884) long since expressed the belief that the species breeds in the wooded regions of the fur countries and north to 68° north latitude. This statement, taken in conjunction with the fact that the great majority of the records for both coasts are winter occurrences, while the majority of the inland records are spring occurrences, would almost suggest the existence of an American stock, resident in this continent and migratory along the same routes as its native relatives. The statement has often been made that the species breeds on the Aleutian Islands, but I must confess that after a careful search I have been unable to find any evidence to support it. Elliott (1882) says distinctly that it does not breed on the Pribilovs, and Dall (1874) says it winters on Unalaska, migrating May 1. Nelson (1887) *believes* it nests on the Aleutians. The statement that it actually nests was, so far as I know, first made by Freke (1882) who says he is indebted to Mr. Ridgway for this information. The statement is then repeated in Baird, Brewer and Ridgway (1884) without comment. It is again made in the American Ornithologists' Union Checklist for 1895, but is very significantly omitted from the edition of 1910. To my knowledge there is absolutely

Greenland

North America

no evidence that the species has ever bred in North America, though I am inclined to think that it may do so.

Migration

The migration of the Widgeon offers no peculiarities. Representative dates show that it arrives in the south of Europe in late February or early March; in western France, middle February; northern Italy, early March; Switzerland, late February; Tyrol, late February; Rumania, late February. Farther north it arrives in March in Lorraine and in Germany. In Hungary, March 10 (average of fifteen years, 1895-1911); Kief, Russia, early April. Still farther north dates of arrival are: Iceland, May 4; eastern Finland, May 15; Lapland, May 31; Petrograd, April; Petchora, May 19. In autumn, a few, probably young birds, arrive in Italy as early as late August, but most pass through Europe in the central sections during late October or early November. There are various reports of small flocks on the Scottish coasts in August. They leave Iceland mostly in late September or early October, while at Petrograd a few appear in late August. In southern Europe some arrive as late as the last of November. In Asia practically the same conditions are found, though in spring on the arctic coast some of the birds do not arrive until early June, and it may be said that in general the spring migration is a week or two later in Asia than it is in Europe. Information concerning the autumn migration in Asia is very meager.

A little work has been done in Germany with marked Widgeon. One specimen banded in Holland in summer was taken in winter 625 kilometers southwest on the French coast. Another similarly marked, was taken on the Dutch coast 250 kilometers from the marking point. A more interesting record is that of a specimen marked in Holland in July, 1910, that was taken in the autumn of 1911 in northern Finland perhaps indicating that the birds of passage on the coasts of western Europe breed farther east in the lands of the northern Baltic. A young specimen marked by Thomson (1911) in Sutherland, Scotland, in June, 1909, was taken in northeastern Holland in September of that year, a significant record; another young bird marked in the same way was taken on the River Trent, England, in January, 1911. One ringed in Warwick, England, October, 1915, was recovered in April, 1918, at Uralsk, north of the Caspian Sea by an officer in the Ural Cossack army. This points to a remarkable east-and-west dispersal of about 2000 miles. Two young, hand-reared birds, marked in Cumberland, England, were recovered near the same place in the autumn of the following year.

Everything indicates a definite sex migration in the Widgeon, females and young of the year working south first and wintering in the southern parts of the winter range. Old males migrate much later and winter farther north.

GENERAL HABITS

Haunts. Widgeon may be regarded as somewhat apart from other surface-feeders, being more gooselike perhaps, but at the same time having something in common with the Pintail and Teal. The European Widgeon, although so similar in appearance to the American bird, is different in its habits, for the nature of the coasts where it winters and its dependence upon eel-grass for its main food have made it almost maritime. No doubt it was once much more of a fresh-water bird in western Europe than it is now. All Widgeon like broad waters, and are not particularly partial to marshes and pond-holes. They are very particular about feeding conditions, and hence are local in their distribution, occurring in great masses where the height of the water and the depth of the food are suited to their needs. On their

breeding grounds they seem fond of wooded, or partially wooded country, and choose nesting sites that are high and often a good distance from water.

The three species of Widgeon are very similar in form and their style of flight is characteristic; their young are easily distinguished from those of other surface-feeders and their incubation period is short.

Wariness. Widgeon are extremely wary, fully as much so as Pintail and rather more so than Mallard, and when gathered together in great packs on the open estuaries of western Europe, the nature of their surroundings makes it almost impossible to approach them by day. There, too, they have been so persecuted by puntsmen with swivel-guns that their education was long ago complete. Millais' (1902) description of their manner of approaching a feeding ground is interesting. The first little pack will come flying in from the open sea against the wind, when the tide is at about half-ebb, and alight about 200 or 300 yards from the shore. Here they remain quietly packed together for some time till the first green fronds of the eel-grass (*Zostera*) appear on the surface near the shore. Then they slowly work shoreward, and after many false alarms begin to feed. Other small packs fly in from the sea and alight directly among the feeding birds, till finally the great packs are formed.

They are usually hard to take in the decoy-pipes of Great Britain and Holland, and only in certain places were great numbers ever caught. Ussher and Warren (1900) mention a decoy in Ireland where none was taken in six years (1882–1888) although three hundred were on the decoy lake most of the time.

English puntsmen find that Widgeon readily take advantage of the alarm-call of other birds, — curlews, red-shanks, oyster-catchers, sheldrakes, etc. — that are even warier than Widgeon. Such birds are apt to catch sight of a punt before the Widgeon and warn them by getting on the wing first (Millais, 1901).

It must not be supposed that Widgeon are so wary in places where they are less disturbed. W. Thompson (1851), speaking of the Belfast region, says that on small lakes the Teal were the first to rise, next the Mallard, and then the Widgeon, followed by the diving ducks. In India, Baker (1908) considers them "cute, wary" birds, but not as wild as some others of their kind. Even in England the first arrivals from the North, which, of course, are mostly young birds, are decidedly unsuspicious and unsophisticated. After they have been driven away there is nowadays little chance of a good shot until midwinter, when frosts and gales tend to make Widgeon, like other ducks, tamer and less alert. The best time to approach them in a punt is said to be the small hours of the morning, when the tide happens to be from half to three-quarters flood, and when, having fed, they are found congregated about the edge of the disappearing mud-flats.

Waterton's (1838) observations about one hundred years ago taught him that the

Widgeon when not molested is less fearful than either the Pochard or the Teal. He was surprised to find how their habits changed as soon as they were protected from guns.

Daily Movements. Widgeon are naturally night-feeders. In their winter haunts the first arrivals are, like other species, day-feeders. Later on they become almost marine in their habits, but feed at low tide both in the day and in the night, unless greatly disturbed during the day. In many places they are forced to keep to the open sea during the whole day, and flight either in-shore, or to inland fresh waters, flooded meadows or even grassy fields at night. The truth probably is that if left strictly alone they would be governed chiefly by the rise and fall of the tide, and would spend at least part of their time on fresh water; nevertheless, even when little disturbed, they, like other ducks, become more nocturnal as winter approaches. Under present conditions they flight more or less after sundown, and very rarely on dark nights. But if the moon should rise during the night there seems to be a second period of activity (Thompson, 1851; Millais, 1902). It goes without saying that on the breeding grounds they are crepuscular, showing little activity during the middle of the day.

Gait, Swimming, Diving. The Widgeon is one of the most graceful and attractive ducks, on the water, on land, and in the air. It walks and runs easily and rapidly and its carriage is perhaps a little more upright than that of the Mallard, the head being closely drawn in. It floats lightly upon the water, but is easily distinguished by the retracted neck and small, finely shaped head and bill, which give it an aristocratic appearance. The upward tilt of the closed wing is a good field-mark in picking the species out at long distances on the water.

It is a skilful diver, but never dives unless wounded, when it is able to cover considerable distances under the water. At least one good authority (R. Gray, 1871) has actually found Widgeon holding themselves under the surface by their bills in shallow water, so that they had to be dislodged with a boat-hook. Such habits, though once commonly spoken of, are now generally regarded as imaginary or accidental and I cannot bring myself to believe that a wounded duck will ever "commit suicide."

Flight. The Widgeon rises as easily as any other duck, and more perpendicularly than most others. It is more light and agile in the air than the Mallard; the wings are more depressed below the body and do not cause a whistling sound.

There is no more beautiful and animated picture than a great flock of Widgeon in full career darting this way and that, wheeling round and round in great circles, only to set their wings suddenly and pitch headlong with meteoric speed until within a

few yards of the water, when they spread out and take the surface as lightly as Teal. On the wing they perform extraordinary evolutions and their long sharp wings, together with the short secondaries evidently give them great speed. When in full flight overhead a peculiar fluttering noise is continually heard, due to the fact, as Heinroth (1911) explains, that one or another of the birds suddenly puts on the brakes, so to speak, by erecting itself and turning the lower surface of the wings forward, and beating against the air with them. One gets the impression that their own speed sometimes becomes too rapid for them. Aside from these fluttering noises and their whistling calls there is no sound from a flock except the rustling of a great mass of birds if they go by close to one. It is characteristic of Widgeon to fly in dense packs without any special formation when on local journeys. Even on very short flights the flocks may consist of several hundred birds, though forty or fifty or a hundred is more common.

In fine weather Widgeon rise to a great height in the air, particularly when passing over dangerous points of land. Migration is performed chiefly at night, or very early in the morning, the flocks at such times thinning out into long wavy, irregular lines, sometimes broken here and there, and sometimes denser toward the center. These lines continually shift and change, and the more regular, gooselike type of flock is certainly exceptional.

On favorite feeding grounds these birds will gather in enormous packs, sometimes numbering several thousands. But such congregations split into smaller groups when flushed or when changing ground. Millais thinks these huge companies occur more commonly after the birds have been driven about a good deal, and may be formed as a sort of mutual protection.

Association with other Species. Although one of the most gregarious of all ducks, the Widgeon does not seem to relish particularly the company of other species. Of course single individuals or pairs are more likely to appear in flocks of other ducks, but it is quite remarkable that the scattering Widgeon which turn up mostly as single birds in northeastern Massachusetts, both *Anas penelope* and *Anas americana*, are almost always alone.

Their aloofness is seen again on the nesting grounds, where their eggs are seldom found in nests of other species. Pintail eggs have been found in nests of the Widgeon in Iceland, with both females incubating at the same time (Slater, 1901), and they are said to nest occasionally there in protected Eider Duck colonies (Hantzsch, 1905). A very remarkable nest with eggs of Widgeon, Scaup, Long-tailed Ducks and Red-breasted Mergansers, was long ago recorded for Iceland by Krüper (Naumann, 1896–1905).

They have been found seizing pond-weeds brought up by feeding Coots in the interior waters of Ireland (Ussher and Warren, 1900), and as they frequent the same

feeding grounds with Brent Geese they occasionally take advantage of the food pulled up by these (Millais, 1902), just as the American Widgeon is somewhat parasitic, or at least symbiotic toward certain diving ducks.

VOICE. The voice of the Widgeon is very characteristic and more like that of the Teal and Pintail than that of the Mallard. They rise silently, but in the air the males are continually uttering a double whistling note, which at a distance is really melodious, while the females less commonly join in with their low purring sound. More specifically the note of the male may be described as a bisyllabic call, *whee-yu*, the first syllable of which is sharper and more whistling. Close at hand the sound is monotonous, rather harsh and grating, and entirely unmusical, but coming down out of the air from a hundred throats it is one of the sounds most dear to the ears of a sportsman.

The female's call may be spoken of as a greatly modified *quack*, a low croaking note almost impossible to describe, but frequently written *krrr* or *chrrr* or even *pur-pur-pur*. The note of attraction, Heinroth (1911) thought, was shorter than the more protracted and repeated scolding call, and the alarm-call is different still. He also describes the pair calling simultaneously so as to produce a unified note. This habit has led many writers to attribute both calls to the male sex.

One is tempted to quote here a few words from Colonel Hawker's famous book of advice to sportsmen: "The thicker the weather, the more silent the Wigeon when pitched. A shrill, clear pipe denotes a single cock-Wigeon, as does a long loud '*purre*' a hen; but when the call of the cock is one short, soft note and not so often repeated, you may expect to find a company. If so you will probably soon hear the birds 'all in a charm' [that is in full concert] if you have the patience to wait and listen."

The lower part of the trachea of the female is simple, but in the male there is a transverse oblong, bony dilatation bulging out on the left into a spheroidal box about an inch in greatest diameter.

FOOD. Widgeon are strictly surface-feeders and grazers, and prefer shallow water where they do not have to tip, or fairly deep water with pond-weeds floating on the surface. But they will also feed "end-up" like a Mallard and like geese are exceedingly fond of grazing on tender grass. Though predominantly vegetarian, some in Scotland and elsewhere have been known to live in winter almost entirely on small cockles (Millais, 1902). In all western Europe their chief reliance in winter is eel-grass (*Zostera marina*) though they doubtless supplement this, where possible, with fresh-water grasses. More unusual marine food is the sea-lettuce (*Enteromorpha clathrata*) which they were noticed eating in Belfast Bay (Thompson, 1851).

In Germany the food in autumn, in the interior, is chiefly the seeds of the floating manna-grass (*Glyceria fluitans*), various potamogetons, duck-weed (*Lemna*),

ranunculi and polygona (Naumann, 1896–1905). In the spring-time they may be seen grazing in the fields on the sprouts of grass and grain, and they also occasionally visit the stubble fields.

The animal food consists of shell-fish, shrimps, insects and their larvæ, snails; occasionally also the spawn of fish and frogs. Naumann (1896–1905) says they may be seen in the morning going to the fields to pick up earthworms and snails. The summer food doubtless consists of much more animal matter. Millais (1902) saw them, as they swam along the shores of one of the Iceland lakes, catching the flies off stones.

The contents of the stomachs of five European Widgeon taken in Massachusetts, Maryland and North Carolina consisted of widgeon-grass, eel-grass, pond-weed, seeds of the bulrush, and a few other items, thus not differing materially from the food of its American cousin (Mabbott, 1920).

Courtship and Nesting. The Widgeon pairs in March or even earlier, not differing in this respect from most shoal-water ducks. The display is simple, so much so, in fact, that Heinroth (1911) considered it almost lacking. But a sort of social play was noted as long ago as 1858 (Jäckel, 1859) and was first adequately described by Millais (1902). I have never seen it carried out fully by my own captive birds. The courting males swim about the female who is ready to receive their attentions. They raise their white pileum feathers, stretch out their necks over the water, and erect the long ornamental scapular feathers. The bend of the wing is also depressed so that the primaries are raised at a sharp angle. All the while the males emit their loud double whistles, for they are the noisiest of all ducks in courtship. Fights among males are rare, but birds in confinement are apt to become jealous when new individuals arrive. Millais (1902) describes a battle royal during which the combatants seized each other by the back of the neck and attempted to down each other. Most, but possibly not all females are fertile when one year old; at least this is the experience of those who have reared them in captivity.

The name *penelope* was given to the Widgeon because of its supposed conjugal fidelity; and so far as known the bird has shown itself worthy of its classical designation. No one apparently has described the nuptial flight of the European Widgeon, which must take place when the birds are on the breeding grounds, for it is well developed and frequently seen in the American species. It would be interesting to know whether the "braking" in mid-air, which causes the fluttering sound described under Flight, is part of the display, and whether it is characteristic of the male sex only. It is always seen and heard in large flocks, and may be simply a form of play-antic.

The nesting dates vary from middle May to late June, depending, of course, on the

character of the season and on the latitude. It cannot be classed as a particularly early breeder for it lays later than the Mallard, Pintail or Teal. In Iceland it begins to breed in early June; in northern Europe the dates are mostly for late May and June, in northern Finland frequently in the latter half of June. On the Petchora River eggs were taken as early as June 5 and on the Jenesei twelve days later (Naumann, 1896–1905; Montell, 1917; Seebohm, 1885; Hantzsch, 1905; etc.).

The nest is always located in a fresh-water region but may be some distance from the water. Rough or wooded situations are often chosen, and the nest itself is not different from that of other shoal-water ducks. Any materials close at hand may be used in its construction.

The ordinary clutch numbers from seven to ten, with a maximum of twelve and an average of about nine. Nests with less than seven eggs are not uncommonly found, and are probably the work of younger birds. The eggs measure from 50–59.9 by 33.2–40.7 mm., averaging about 55 by 38 mm. In color they are buffish white or cream, without ever having the slightest trace of green. They are very like the eggs of the White-eyed Pochard and Gadwall, but may be distinguished from these by their more creamy color (Seebohm, 1896). The nest down is dark but not characteristic; the feathers that are found among it, however, are unmistakable, being white, sometimes with gray centers that spread to the tip (H. Noble, 1908). The nest feathers of other species are sometimes used by ducks, so that care must be taken in making a diagnosis.

The incubation period is probably twenty-four days (Job, 1915) though it has been placed as low as twenty-two or twenty-three days by Heinroth (1908) and as high as twenty-five days by various other writers. It is certainly three days less than that of the Mallard, which perhaps indicates an affinity with the Teal. During incubation the male behaves in the same way as does the Mallard, visiting the female less and less until toward the middle of the period he disappears completely. Hantzsch (1905) claims to have seen the male occasionally visit the female after the young have been hatched. Nothing is recorded about the very interesting question whether the female returns to her own brood after she has completed her moult. Immediately after deserting the females, the males flock together and evidently make excursions of some length, for in the month of July flocks composed entirely of males are mentioned by writers.

Status. The Widgeon has always been one of the commonest and most eagerly sought of European ducks, and its original status is difficult to determine because enormous numbers were taken in decoys even before the end of the 17th century. We do not know whether the great drives of moulting ducks in the Lincolnshire fens produced many Widgeons or not. In the old decoys of Essex enormous takes were made in former days and some interesting figures of the Canney Marsh Decoy are

given by Cordeaux (1896). It was started in 1714, and from that year to 1726 no less than 44,677 Widgeon were taken out of a total of 50,587 ducks. The great takes were made in September, October and November, that is, during the autumn migration. In Somerset and Devon more were caught in the old decoys than all other species combined (MacGillivray, 1852). But in other locations, as in the famous Ashby Decoy (Lincolnshire), the proportion was much smaller, only 2019 Widgeon being taken in a total of 96,000 ducks decoyed from 1833 to 1868. Though the Widgeon has decreased in recent years the numbers are still relatively large as compared with other species. In the Orielton Decoy (Pembroke) there were 4150 Widgeon in the total of 8433 ducks taken between 1877 and 1885, but in the Iken Decoy (Suffolk) only 1267 Widgeon out of a total of 12,683 ducks were taken in the same years. Actual numbers taken probably do not represent the species numerically, because Widgeon are very crafty and do not decoy as easily as Mallard or Teal. The Widgeon is the chief game of punt-shooters, and as many as 1200 were taken by Payne-Gallwey in 1880–81 out of a total of 1500 wild-fowl. Although the species must have been greatly reduced in the past hundred years it is still found in companies aggregating thousands on the Scotch estuaries, especially on the northeast coast, where they must be fully capable of taking care of themselves, or they would long since have been wiped out. Abel Chapman (1889) thought that not over 10 or 15% of these bodies of Widgeon were destroyed in any one season, which in itself is not enough to endanger the species. But modern commerce and its effect on harbors must also be taken into account.

Its history as a breeding species in Scotland is very interesting, because it has shown a marked increase since the late '70's, when it was only a rare breeding bird in the northern parts. About 1880, a great southern movement began and to-day the species breeds in various localities throughout the whole country, and has even spread south into the northern counties of England (Millais, 1902; Baxter and Rintoul, 1920).

When Mr. L. Griscom visited the Carmague district, southern France, in December, 1918, he estimated that there were at least 100,000 Widgeon wintering there.

An old writer, Faber, did not consider the species so common a nesting bird as the Pintail in Iceland, but Millais (1902) found it much more abundant, outnumbering it ten to one in certain localities.

There has been much speculation as to whether this bird has increased on the Atlantic coast of North America. The first one was reported by Giraud, who obtained it in the Fulton Market, New York, in December, 1842 (Giraud, 1844), the second by Dr. Samuel Cabot in 1848 (Proc. Boston Soc. Nat. Hist., vol. 3, p. 21, 1848). At Currituck (North Carolina) it was apparently well known as long ago as 1880, but was considered a cross between the Baldpate and the Green-winged

Teal (Deane, 1880). When I shot there between the years 1897 and 1912 it could scarcely be considered an uncommon bird, and I once had four males come to my decoys at one time. Of course practically none of the females was recognized except when specially looked for. I have some reason to think that the species may not be so common to-day in North Carolina as it was fifteen to twenty years ago. At Wenham, Massachusetts, I have taken sixty-two American and no less than thirteen European Widgeon in twenty-two years. These last were apparently all young, and no fully adult male was ever seen there.

Enemies. The enemies of the Widgeon are those of all palæarctic shoal-water ducks and have been discussed under Mallard. Millais (1901) seems to think that the Great Black-backed Gull will sometimes kill adults on the wintering grounds, but most of the birds killed in this way are probably sick or crippled. C. Smith (1881) found that the Herring Gulls are very destructive to young Widgeon reared in semi-captive condition.

Damage. Injury to crops must be very slight because this has never been particularly referred to in the literature.

Food Value. On the whole the flesh of the Widgeon is good, but considered inferior to that of Mallard and Teal. When its food is principally eel-grass and some fresh water is also obtained, it is excellent. In some cases, however, the birds live on marine animal food, as at Dornoch, Scotland, and the flesh then acquires a poor, bitter taste, rendering it at times inedible (Millais, 1902). On the coast of Northumberland where there is no *Zostera*, they become exceedingly rank (W. Thompson, 1851), and the same applies to other parts of the English coast. In India they are considered inferior to many other species (Hume and Marshall, 1879; Baker, 1908). On the Chinese coast also, there seems to be great variation in the flesh. According to La Touche (1892) the Foochow Widgeon are very good, while those from Swatow are very bad. I see no reason why Widgeon feeding on *Zostera* alone are not just as good as our most delicious North American Brant from the east coast.

Hunt. The old methods of taking Widgeon and other fowl are so numerous as to make it impossible to mention more than a few of them. The ancient system of clap-nets is still used in Holland for taking these ducks. The fowling floors where these nets are used are constructed with great care and consistently baited. An engine known as the "spring" which was used in English fens, and a system of springs and nooses called the "wile" was used on the English side of the Solway Firth (MacPherson, 1897). Widgeon and other fowl were taken in the seventeenth

century with lime placed on strings and twigs. Receipts for poisoned bait are given in some of the old books (Gentlemen's Recreation, 1697).

Widgeon, as well as Mallard and Teal, have always been the principal ducks taken in the decoys of England, Holland and Germany. They were shot on the flats, from barrels sunk into the mud on the feeding grounds, but the numbers bagged in this way were comparatively small. Nets spread on the salt-marshes were also used (W. Thompson, 1851). When swivel or punt guns were introduced, carrying as much as a pound of shot, great numbers of Widgeon were killed for the first few years. Their habit of feeding in closely packed companies of great size rendered them especially liable to destruction by such means. In those days as many as seventy-six Widgeon were taken at one shot (W. Thompson, 1851), and there is one shot recorded in the Encyclopedia of Sport (1897–98) which accounted for ninety-three! Since that time the guns have been increased in size, but, according to Millais and other modern writers, it seems that the great shots of other days are never to be had now. I am not certain when the punt gun was first invented, but it apparently did not reach Belfast Bay until about 1820. This method of shooting ducks is looked upon with horror in America but this view is, I think, entirely wrong. The weapon with which fowl are shot is merely incidental; it is the method that counts. Compared to the difficulties and even the dangers of punting fowl on the great ooze beds of the British coasts, the shooting of ducks, and often baited ducks, over decoys, is tame sport indeed. As well compare the stalking of wild sheep with the shooting of driven roe deer in a German forest. Many British sportsmen have written extensively on the science of punt shooting; among these are Hawker (1824), Folkard (1859), "Wildfowler" (1880), Payne-Gallwey (1882), A. Chapman (1889, 1896), Sharp (1895), Millais (1901), Duncan and Thorne (1911).

The prices paid for mixed wild-fowl early in the eighteenth century ranged from 10 to 12 shillings, sometimes as high as 16 shillings, the dozen (Payne-Gallwey, 1886). Until about 1850, Widgeon brought from 1 shilling 6 pence to 2 shillings 6 pence the pair, after which they seem to have declined in value on account of the general abundance of game in the markets (W. Thompson, 1851).

Shooting at Widgeon during their evening flights to inland waters, or while they are traveling overland from one bay to another has always been a favorite method, but large bags are not obtained in this way unless the weather is extremely severe. The hut-shooting, so much in vogue in France and Belgium, is described in detail by Ternier and Masse (1907).

In China great numbers of Widgeon must be taken, since they have been imported to European markets from the lower Yangtse (Ghidini, 1911).

Behavior in Captivity. The Widgeon is one of the most attractive of all the smaller water-fowl. It is hardy, long-lived, vivacious, and while tame enough it does

not become indolent or uninteresting. Though a favorite bird in Europe and America, and very commonly kept in both public and private gardens, it cannot be called a ready breeder. In the London Gardens it bred less frequently than many other species (P. L. Sclater, 1880), and Rogeron (1903) admits that after twenty years he had not succeeded in inducing his birds to lay. C. Smith (1881) seems to have been one of the first amateurs to breed it to any extent in England, and Sir Ralph Payne-Gallwey was also successful. In Germany amateurs appear to have reared them not uncommonly at least as early as 1828 (Naumann, 1896–1905). In recent years many have been bred at Netherby (Cumberland) by Sir Richard Graham, where they are said to have laid almost as freely as Teal (Gladstone, 1910). Mr. Wormald and Mr. St. Quintin as well as Lord William Percy have also reared many, and in Holland Mr. Blaauw has been as successful with Widgeon as with most other species he has attempted.

In England the price for live birds has always been very reasonable, averaging perhaps 25 shillings a pair, and fine hand-reared ones can even now be purchased for about 40 shillings. We used to buy them here in America for $12.00 to $15.00 per pair, sometimes less. The species has been bred in America by Mr. Henry Cook of Woodbury, Long Island (New York), and by Mr. John Cox at Brewster, Massachusetts.

An interesting method of artificially increasing the breeding stock of several species of wild ducks has been carried out in England, at Netherby, by Sir Richard Graham. The fowl are caught in considerable numbers in decoys, their wing-feathers are clipped and they are kept through the winter in enclosures. In the spring, a short time before the breeding season, the stumps of the primaries are pulled and the birds returned to their enclosures. In three or four weeks they will be flying, but the season is then so advanced that the migratory impulse is subordinated to the breeding instinct. Ducks so managed are much more likely to breed than are pinioned birds, and much of the recent increase of breeding Widgeon, Gadwall and Shovellers in the British Isles is doubtless due to this and other practices carried out on a large scale.

Another famous Netherby experiment made by Sir Richard Graham consists of crossing Widgeon, Pintail and Gadwall, with Mallard and then crossing the resulting hybrids back to pure stocks, until a nearly pure home-bred local stock has been produced. In the case of the Widgeon the Netherby stock was started in 1903, and when Millais reported upon it in 1913, there were at least a thousand there.

The Widgeon is long-lived in captivity but not exceptionally so. The average duration of life of forty-one specimens kept in the London Gardens was about five years, the maximum being about thirteen (P. C. Mitchell, 1911). The Giza Zoological Gardens at Cairo, in their report for the year 1921, list one specimen which had

lived in the Gardens for thirteen years and four months. But Meade-Waldo (London Field, May 25, 1897) has recorded specimens kept for eighteen, twenty-two and twenty-three years respectively, while Schmidt (1878) claims to have kept one for the incredibly long period of forty-one years, a record which is more than doubtful.

Hybrids. Considering the enormous numbers of Widgeon that have passed through the hands of observant sportsmen and naturalists, the per cent of wild hybrids recorded is extremely small. Suchetet (1896) lists wild hybrids between this species and the Pintail, Common Teal, Mallard, Garganey and Gadwall. Van Kempen (1890) has described hybrids between the Widgeon and the Formosan Teal and between the Widgeon and the Black Scoter, both probably wild, though the history of the specimens is not known. Mr. N. Kuroda of Tokio writes me that he has taken no less than three wild crosses between this duck and the Falcated Teal (*Anas falcata*) in his decoy-pond at Haneda, Japan, between 1907 and 1922 (see Tori, vol. 3, 1923, for plate).

In captivity the Widgeon has been crossed with the Carolina Duck, Red-crested Pochard and the Tufted Duck (Poll, 1911), and I saw a hybrid with the Falcated Teal in the Amsterdam Gardens. The American and the European Widgeons have been crossed on the estate of Earl Grey in Cumberland, and a mating between *Anas penelope* and *Anas sibilatrix* produced a hybrid which strikingly resembled the American Widgeon (Shaw-Bailey, 1918).

AMERICAN WIDGEON

ANAS AMERICANA GMELIN

(Plate 29; Plate 30)

SYNONYMY

Anas americana Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 2, p. 526, 1788.
Anas wigeon Bonnaterre, Encyclop. Méthodique, vol. 1, p. 129, pl. 33, fig. 4, 1790.
Mareca americana Stephens, General Zool., vol. 12, pt. 2, p. 135, 1824.
Marica americana Swainson, Classification of Birds, vol. 2, p. 366, 1837.
Chaulelasmus americanus Lichtenstein, Nomenclator Avium Mus. Berol., p. 102, 1854.
Mareca penelope β americana, Blasius, List Birds Europe, p. 21, 1862.

VERNACULAR NAMES

English: American Widgeon, Baldpate, Poacher, Wheat Duck, Bald Crown, Bald-faced Widgeon, Green-headed Widgeon, Baldhead, Southern Widgeon, White-belly, Smoking Duck.

German: Amerikanische Pfeifente.

French: Canard d'Amérique.

Creole: Zin-zin.

Spanish: Pato chalcuan, Pato cabanca.

Mexican: Xalcanauhtli.

Guatemala: Gallareta.

Eskimo: Nimimipikhtwan, Tingazomear.

DESCRIPTION

ADULT MALE: Forehead and whole top of head white, or pale buff. Sides of the face and neck white or cream color, thickly dotted with black. Behind the eye a wide patch of iridescent green running back and meeting its fellow at the occiput. This green patch is often merely a series of green spots. Mantle and scapulars vinaceous brown, finely vermiculated with wavy black lines. Back and rump gray, finely vermiculated; rump nearly white. Breast and sides of breast same as in European Widgeon. Lower parts similar, but flanks more vinaceous in tone. Under tail-coverts, tail and upper tail-coverts as in *Anas penelope*. Wing as in the European bird, but the axillars are either pure white or slightly speckled at the tips, never speckled all over.

Bill bright slate-blue, black at the tip, and with a black line along base of culmen. Legs and feet yellowish to bluish brown, webs dusky. Iris dark brown.

Wing 252–270 mm.; bill 45–48; tarsus 36–41.

Weight 2 pounds to 2 pounds 7 ounces (0.95 to 1.1 kilograms), the maximum weight recorded twice by myself. Average for birds in good condition, a trifle over 2 pounds.

ADULT FEMALE: Very similar to *Anas penelope*, especially the gray types of that species, but the head usually much grayer. Axillars pure white, or with only a few freckles along shaft, or near the tips;

never freckled darkly all over. In July the breeding females become darker, especially on the top of the head, and on the mantle and scapulars. Bill, legs and feet almost the same as in the male, but somewhat duller in tone; iris dark brown.

Wing 236–258 mm.; bill 33–37; tarsus 37–40.

Weight 1 pound 8 ounces to 2 pounds (0.68 to 0.95 kilograms), maximum weight recorded once by myself. Average for birds in good condition 1 pound 12 ounces (0.79 kilograms).

YOUNG FEMALE IN FIRST (JUVENAL) PLUMAGE: Like adult female, but mantle more uniform and lacking light bars for the most part. Wing-coverts lacking the well-defined light borders of adult specimens. Green of speculum absent or poorly developed. Tips of tail-feathers blunt. No elongation of central feathers.

YOUNG MALE IN FIRST PLUMAGE: Closely resembles young female, but by September the median wing-coverts usually begin to show more white, mixed with the gray feathers. The mantle is more or less barred with fulvous, as in the adult female. In the month of October obscurely vermiculated feathers begin to appear upon the mantle or scapulars, and a few iridescent green feathers may be present above or behind the eye.

YOUNG MALE IN FIRST WINTER: Gradually assumes adult plumage, which may be attained by March, but is probably very seldom perfect before the age of sixteen or seventeen months, that is by the second autumn.

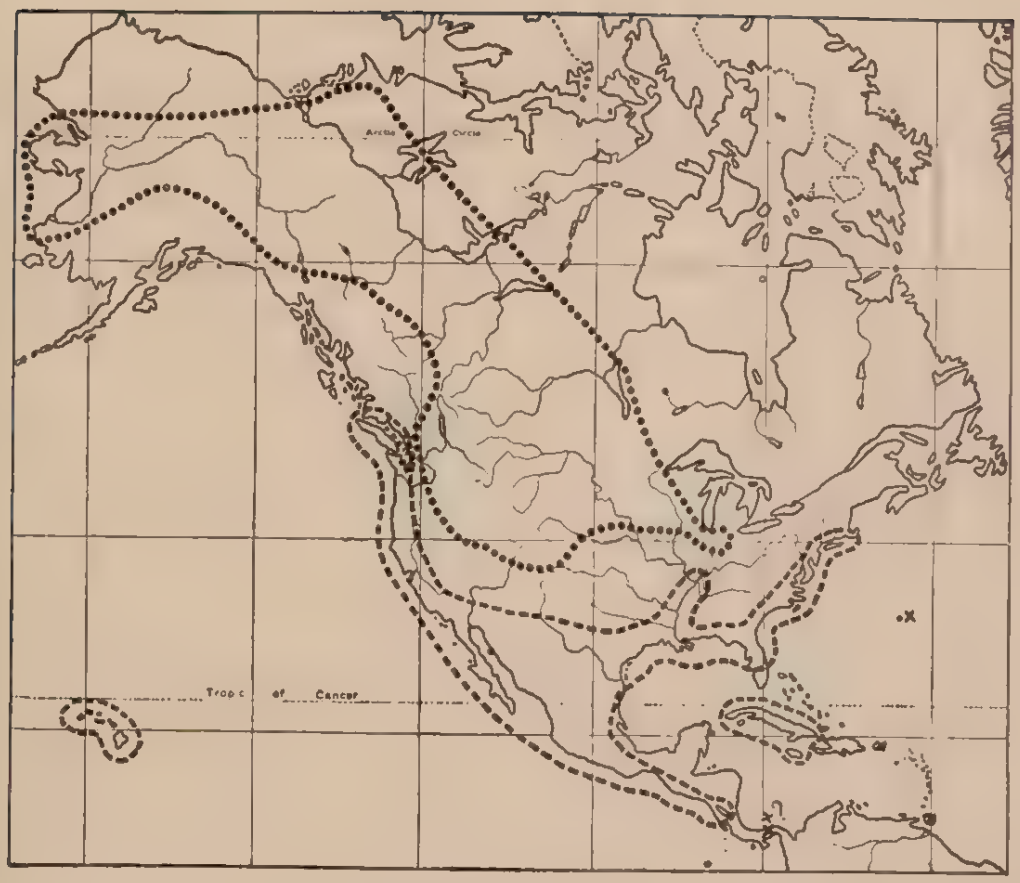
MALE IN ECLIPSE PLUMAGE: There is a general resemblance to the female, but the coloring of the head, sides of the breast and flanks is much richer in tone, inclining to chestnut instead of to dull brownish. The mantle and scapulars also are somewhat richer in color and may contain a few vermiculated black-and-white feathers. The wing has the large white elbow-patch as in the winter plumage, so that the adult male can always be told at a glance at any time during the summer. It is not easy to distinguish this species in full eclipse from the European Widgeon in full eclipse except by the much grayer head of the former.

YOUNG IN DOWN: Apparently some are indistinguishable from those of the European species. Other specimens which I have seen show a little more tendency to a dark orbital streak or to a difference in tone of the body coloring (see under European Widgeon), but the downy young of ducks are apt to vary considerably, and I do not think this denotes any real difference. Young with first feathers upon scapular region, abdomen and sides, can be easily told from the young of Mallards by the more rusty look of the flanks, and by the shorter bill.

DISTRIBUTION

BREEDING RANGE

THE breeding grounds of the American Widgeon lie chiefly in western Canada, though it nests to a certain extent in the plains of our western States. The easternmost records of its breeding are for Indiana, where, according to A. W. Butler (1898) it is a rare summer resident in the northern part. The U.S. Biological Survey has more recent notes of its nesting at English Lake in the same State. It does not breed in Michigan (Barrows, 1912), nor in Illinois, and only to a very limited extent in Wisconsin, about Lake Kushkonong (Kumlien and Hollister, 1903; U.S. Biological Survey). According to Roberts (1919) it does not breed even in Minnesota, but Hatch (1892) gives several older records for the State, and Mr. Avery, of the U.S. Biological Survey, found many breeding there in 1918.



MAP 43. Distribution of American Widgeon (*Anas americana*)

Breeding range, dotted line; winter range, broken line
Sporadic records indicated by crosses (×)

Farther west it is said to be a rare summer resident as far south as Kansas (Goss, 1886; Bunker, 1913) although H. Harris (1919) says it is not known to breed in the Kansas City region. It nests rarely in the sand-hill region of Nebraska too (U.S. Biological Survey notes; Bruner, Wolcott and Swenk, 1905; Oberholser, 1920), but various reports of its breeding in Louisiana need verification. It appears to be an uncommon breeding bird in South Dakota (McChesney, 1879; U.S. Biological Survey) but nests commonly in North Dakota (Coues, 1874; Bent, 1901–02) and in Montana (Coues, 1874; A. A. Saunders, 1921). It is probably a summer resident to some extent in Wyoming (W. C. Knight, 1902) for it breeds, though not commonly, in Colorado (W. L. Sclater, 1912), and probably in certain parts of New Mexico, — Lake Burford (Wetmore, 1920), — and perhaps in the Mogollon Mountains in Arizona (Mearns, 1890). It nests also in parts of Utah (Wetmore, 1921; D. M. Lindsay, U.S. Biological Survey), in Nevada (Hoffman, 1881; Cooke, 1906) and in Idaho and Montana (Wyman; Thomas; U.S. Biological Survey). In California it has been found breeding only in Modoc County (W. L. Dawson, 1916), but it is rather common and breeds in southeastern Oregon (Bendire, 1877) and it is practically certain that it nests in the interior of Washington (W. L. Dawson and Bowles, 1909).

Kansas **Dakotas** **Wyoming** **Arizona** **Oregon**

In Canada the breeding range lies chiefly east of the Rockies, though some nest in the interior of British Columbia (Kermode, 1904; A. Brooks, 1918). It does not seem to be very abundant as a breeder in Alberta (Horsbrugh, 1915; Soper, 1918) but it is a common breeder in Saskatchewan (J. and J. M. Macoun, 1909) especially in the Churchill River region (Buchanan, 1920). Some time ago it was a common nesting bird in western Manitoba (Seton, 1886) about Lake Manitoba and Lake Winnipeg (E. E. Thompson, 1891) but it is said to be very scarce now in the Shoal Lake district (Taverner, 1919). This is about the eastern limit of the breeding range in Canada, though single specimens have been recorded from Hudson Bay, the Nelson River and Fort Churchill (Preble, 1902). Buchanan (1920) reports it from a locality north of Fort du Brochet.

Western Canada

The breeding grounds *par excellence* of this species seem to lie farther north, in the region about Lake Athabasca, Great Slave Lake, and in the MacKenzie and Yukon basins. Preble (1908) says it is abundant throughout the wooded portion of this district. His party met with it on the lower Athabasca and Peace Rivers, about Lake Athabasca, along the Great Slave River and about Great Slave Lake, and thence northward along the MacKenzie as far as Forts Good Hope and MacPherson. Mr. Francis Harper, who visited the region about the Athabasca Delta for me in 1920, found it seventh in abundance among the ducks, and took several nests. Stefánsson (1913) found it on the Hay River and Great Slave River, and MacFarlane (1908) says it is common from Fort Resolution north to the Anderson River. He took nests at Fort Anderson, and farther east on the Swan River. Stefánsson was told that it is found rarely on the Horton River (Franklin Bay). Some of these far northern records are not of breeding birds, but may be accounted for by summer excursions northward of young birds or males that are through breeding.

MacKenzie

Farther westward the species has been taken on the Macmillan River (Osgood, 1909), on the Peel River (Preble, 1908) and on the Porcupine River (U.S. Biological Survey). It has not yet been seen on the Arctic coast of Alaska, but appears to be not uncommon in the Yukon Basin (Dall, 1869). Blackwelder (1919) found it the commonest duck on the Birch Creek Flats (upper Yukon). On the coast of Alaska it seems to breed as far north as Kotzebue Sound (Nelson, 1883). It is said to nest commonly on the coasts of Norton Sound (Nelson, 1883) but seems to be rare about St. Michael's (Nelson, 1887; Dall, 1869). There is no record of its occurrence on the eastern Aleutian Islands excepting one for Atka; it is reported as rare on Attu (Turner, 1886). A dead specimen was found on Bering Island on May 1, 1883 (Stejneger, 1885). The only record for the Alaska Peninsula is that by Gianini (1917) who saw a pair on June 2 near Stepovak Bay. In southeastern Alaska the species is not common, and probably does not breed. It has been noted at Big

Alaska

John Bay and Rocky Pass (Bailey, MS.). Specimens have also been taken on Admiralty Island (J. Grinnell, 1910).

The Baldpate is said to breed in the Valle de Mexico (Villada, 1891–92) but this is very unlikely. Other sporadic summer occurrences are those for Detroit, Toronto, Ottawa, Montreal, Quebec, southern New Brunswick and Halifax (U.S. Biological Survey). There are numerous reports of its appearance in southeastern Labrador, but only the record for Old Fort Bay seems to be trustworthy (C. W. Townsend and Allen, 1907). Cooke (1906) says it has been taken as far east as Newfoundland.

Eastern Canada

A word must be said about the reputed occurrence and breeding of this species in northern Iceland. Coburn claims to have made this remarkable discovery in the summer of 1899, and in 1901 exhibited adult males, females, and nestlings to the British Ornithologists' Club (Bull. British Ornith. Club, vol. 12, p. 14, 1901), at which time no one seems to have questioned him about it. In the description of his trip Coburn (1901) says he found the species in three different localities, in two of which it was breeding. "The Icelanders knew the male well enough, although as a rare visitor, but regarded it as being only a variety of the Common Widgeon. The female they could not distinguish at all," he says. Hantzsch (1905), in his monograph on the birds of Iceland, points out that Coburn fails to give any localities for his remarkable find, and says he could not reach Coburn by mail. But Dresser and Sharpe, to whom he wrote, seemed inclined to accept Coburn's statement. Hantzsch himself gives an Icelandic name for the species (Ameriskur Önd) which would indicate that the natives knew it, as Coburn says. From his account it would seem that Coburn was in northwestern Iceland. I might also say that Hartert (1920) regards the whole story as incredible, and I have since been informed that Coburn's work cannot be taken seriously.

Winter Range

The Baldpate spends the cold season chiefly in the southern, coastal fresh- or brackish-water regions of the United States. On the west coast it is common in the southern part of British Columbia (Kermode, 1904; A. Brooks, *in litt.*) and is said to be the commonest duck on the coasts of Washington (W. L. Dawson and Bowles, 1909). It is found abundantly on the coasts and great lakes of Oregon (Pope, 1895–96; Woodcock, 1902; U.S. Biological Survey), in the interior valleys of California (Grinnell, Bryant and Storer, 1918), and in southern Arizona (Swarth, 1914), southern New Mexico (Cooke, 1906) and southern Texas (Sennett, 1879). On the coasts of Texas it is very plentiful (Sennett, 1878; McAtee, *in verbis*) and it is common in Louisiana also (Beyer, Allison and Kopman, 1907). In the Mississippi Basin it winters far north, reaching even to Illinois (Cooke, 1906). It has even been reported from Idaho in late December. It is found along the entire Gulf Coast, but in Florida it does not occur south of Fort Bassinger (U.S. Biological Survey).

British Columbia

Western States

On the Atlantic coast it is found in Georgia, very abundantly in South Carolina (Wayne, 1910), in great numbers in North Carolina (*vide* Status), Virginia (Rives, 1890), Maryland (Kirkwood, 1895) north as far as Baltimore (U.S. Biological Survey), and in Delaware (Rhoads and Pennock, 1905). Farther north it occurs in winter only irregularly, on the coasts of Rhode Island, Massachusetts and even in Maine (G. M. Allen, 1909).

Atlantic Coast

South of the United States the Baldpate winters in Lower California (Brewster, 1902) and in Mexico proper at least as far south as the Valle de Mexico. Grayson found it common at Mazatlan in November (Lawrence, 1874). Salvin and Godman (1897–1904) give Cachuta, Sonora, Hermosillo, Presidio de Mazatlan, Guanajuato as specific localities where it has been found. Villada (1891–92) says it is common in the Valle de Mexico, and Beebe (1905) found it abundant about Lake Chapala. Specimens have also been taken in Jalisco, Colima and Michoacan (U.S. Biological Survey). Farther south the species has been taken in western Guatemala at Dueñas,

Mexico

Chiapam, Lake Atitlan (where it is common), Laguna, Acapam and San Geronimo (Salvin and Godman, 1897–1904). It has been traced even farther to Nicaragua at El Boquete on the lake, where it has been seen in flocks (Rendahl, 1919). De Armas (1893) includes the species in his list of the birds of Colon.

The Baldpate occasionally visits some of the Pacific islands. Beck (1907) says he saw many on Clipperton Island, and it is occasionally found on Oahu, Maui and Laysan in the Hawaiian Islands (R. C. L. Perkins, 1903). In recent years it has been taken even in Japan, near Haneda (between Tokio and Yokohama), on December 4, 1908, and January 16, 1918 (Kuroda, 1920). Pacific Islands

In the Atlantic the species wanders south as far as Trinidad (F. M. Chapman, 1894) and occurs occasionally on St. Thomas (Cory, 1889), Porto Rico (Wetmore, 1916) and Jamaica (P. L. Sclater, 1910). According to Gundlach (1875) it is common in Cuba from September to April or May, but this must have been under exceptional conditions. It has been taken on Andros in the Bahamas (Riley, 1905) and is known to have straggled to the Bermudas, notably in 1854 (J. M. Jones, 1859; Reid, 1884). In the Azores it has been taken on San Miguel, and is said to be not uncommon (Hartert and Ogilvie-Grant, 1905). There are a number of references for Europe, many of which are undoubtedly for escaped birds. The only valid ones seem to be three for Great Britain (Brit. Ornith. Union Checklist, 1915) and one for Le Crotoy, France, April 13, 1875 (Marmottan and Vian, 1879). Recently the Baldpate has been twice taken in Scotland: in Fife and Stirling (J. A. Anderson, 1920; Rintoul and Baxter, 1920). Trinidad West Indies Azores British Isles

Migration

Throughout the west-central parts of the United States the Baldpate occurs almost exclusively on passage. This area includes chiefly Kansas, Nebraska, Missouri, Iowa, Illinois, Wisconsin, Indiana, Michigan and Ohio. The migration appears to be primarily from southeast to northwest and return. Representative dates of arrival as given by Cooke (1906) are: western New York, March 23; Erie, Pennsylvania, March 24; Oberlin, Ohio, March 17; southern Michigan, March 25; Keokuk, Iowa, March 15; central Nebraska, March 17; Loveland, Colorado, March 10. After reaching this latitude the birds proceed more slowly, arriving at Heron Lake, Minnesota, on March 29; in southern Manitoba, April 20; at Terry, Montana, April 8; at Indian Head, Saskatchewan, April 24; and at Osler, Saskatchewan, May 2. Cooke (1906) makes some interesting observations as to the rate of progression. He reckons an average speed of seventeen miles per day from central Nebraska to Heron Lake, Minnesota, and of eighteen miles per day from there to southern Manitoba. The average rate from Colorado to Montana he figures at sixteen miles per day and thinks this rate is maintained northward to Saskatchewan. In his opinion the MacKenzie River breeding birds do not come from the Atlantic nor up the Mississippi, but from the Pacific coast, as the known rate of advance for the Mississippi River migrants would bring them to the far-northern breeding grounds at a date much later than is actually the case. Banded specimens may some day settle questions like this. Widgeon reach the mouth of the Yukon early in May, and the earliest record for the lower MacKenzie is late April, which must be regarded as very exceptional.

In the autumn the first birds appear in the northern States in mid-September, and on this southern migration the species is more common in the northeastern districts, Ontario, Quebec and the Maritime Provinces, than in spring (J. and J. M. Macoun, 1909) and the same is true in the New England and Middle States. At Squibnockett Pond, Martha's Vineyard, Massachusetts, in 1919, the first arrivals were six or eight, noted on August 31. By September 15 there were thirty there, and on the 21st of September about seventy-five. I saw a single specimen on the Kennebec River, Maine, on September 5, 1919. This shows that there is a flight probably of young birds very early in the

season. The main body, says Cooke (1906), arrives in the northern United States in early October, reaching the Middle Atlantic States about the middle of the same month. Some stay as late as the end of September in Alaska, the end of October in Ontario and early November in Alberta.

Spring records for New England do occur, although they are rare. I have never seen but one pair in Massachusetts. The spring route is evidently not much farther west than the autumn route, for at Monroe, Michigan, during fifteen years they were killed regularly in fair numbers.

Sporadic records show that Baldpates do straggle as far east as Harrington, north shore of the Gulf of St. Lawrence (H. F. Lewis, 1922), but it is a very rare bird in all of Canada east of the Great Lakes.

GENERAL HABITS

HAUNTS. The Baldpate is notoriously local and irregular in its distribution, even where it occurs in large numbers, as it does on Currituck Sound. In Massachusetts there seem to be but three sheets of water suited to its needs, and here it remains until frozen out in the late autumn or early winter. It is not particularly a marsh duck, but depends upon large sheets of water, where pond-weeds (*Potamogeton*) and widgeon-grass (*Ruppia*) float on the surface or are not so deep that the bird cannot easily reach them. It is far more of a fresh-water bird than its European cousin, but this is perhaps due to the greater abundance of brackish and fresh-water sounds on our coast, rather than to any innate differences in the two species. As one goes south from Currituck to the salt sounds of Albemarle and Pamlico one finds fewer and fewer Widgeon, but where a large artificial lake has been constructed on Pea Island beach (North Carolina) the Widgeon and other fresh-water ducks appear regularly. They never seem to feed with the Brant, as the European Widgeon does.

On the Pacific coast, where brackish lagoons are less abundant, the Baldpate is found, at least on migration, on the tidal flats of Puget Sound (W. L. Dawson and Bowles, 1909) and in British Columbia. Major Allan Brooks, who is familiar with both the European and the American species, tells me that at Comox, British Columbia, on the east coast of Vancouver Island, the wintering Widgeon were just as maritime as their relatives on the tidal estuaries of the British Isles; although he does not think that they prefer eel-grass (*Zostera*) to all other sea-plants.

Identification of the Baldpate on the water is rather easy on account of the small head and bill, pale-rusty coloring (in the females and young) and (in the males) the presence of the white head-cap. In flight the deeply depressed wings on the down stroke, the snow-white breasts and the male's whistled note are diagnostic.

WARINESS. The Baldpate is rightly regarded as one of the wariest of shoal-water ducks, and one most uncertain in its behavior. Its habit of keeping in large flocks and of circling many times before alighting in any suspected locality gives it a much better opportunity than most ducks have of discovering the concealed hunter and

the nature of his counterfeits. G. B. Grinnell (1901) regards it as the shiest of all our ducks, but it is doubtful if it exceeds the Pintail in wariness.

On its northern breeding grounds it is not considered at all a shy bird (Preble, 1908) and Audubon thought it less shy than most other ducks, at least in secluded districts. It was long ago found to be one of the most difficult birds to bring within shot by the old method of toling with a dog, which was used so successfully on many species of diving ducks (Baird, Brewer and Ridgway, 1884).

Small companies or single birds approach decoys much more easily than the larger flocks in which there are always old, wary males who continually whistle and draw the less cautious ones away from the danger point. They seem to be a mixture of curiosity and caution, and sometimes flocks will continue to circle over and alight in a locality where they have heard the sound of guns all day long. Bowles (W. L. Dawson and Bowles, 1909) says he has lured them within ten yards, by lighting a pipe and puffing a cloud of smoke into the air at short intervals!

Daily Movements. Baldpate are among the first water-fowl to acquire the sea-going habit after arrival on our Atlantic coast. Forty or fifty years ago they were said never to leave Currituck Sound during their autumn and winter stay, but their habits have been greatly modified by time and circumstances, and now they go out to sea about sunrise. There are three days a week at Currituck, during which shooting is forbidden by County law, and during these days fewer Baldpate take refuge on the ocean. Audubon spoke of them as feeding at all hours of the day when in full security, but in inhabited sections feeding at night or in the morning.

Gait, Swimming, Diving. In these respects the Baldpate differs in no way from the European Widgeon.

Flight. There is nothing characteristic about the flight, which closely resembles that of its Old World cousin, the rustling or fluttering sound being heard in both species. Large flocks are common on the wintering grounds. When traveling short distances no special formation is observed. On migration the flocks thin out into long wavering lines or very blunt wedges, but it seems that by the time the birds reach their northern breeding grounds, and are following up the retreating ice the flocks split up into pairs or small parties (Baird, Brewer and Ridgway, 1884; F. Harper, MS.).

Association with other Species. As the Baldpate prefers open water to marshy districts, it associates less commonly with Mallards or Black Duck. On the other hand I have seen them mingle with great masses of Pintail, and Audubon also speaks of their mixing with Pintail and Teal rather than with the larger marsh ducks.

The older writers were much impressed by the parasitic habits of the Baldpate when feeding among diving ducks, especially the Canvas-back and Red-head. They noted the superior agility of the Baldpate in seizing wild celery and other food brought up by deep-water ducks. I have often watched them feeding among Scaups and Redhead, and I believe that this association is of the most amicable kind. The divers prefer the roots and seed-pods of the vegetation brought up, while the Baldpate is interested chiefly in the blades of these grasses, so there is probably no occasion for the contention which some writers describe.

On the breeding grounds this species does not commonly deposit its eggs in the nests of other ducks, but in North Dakota, Bent (1901–02) found one Baldpate's nest containing eggs of the White-winged Scoter, and another containing an egg of the Lesser Scaup. Shoveller's eggs have also been found in a Baldpate's nest (Job, 1902).

Voice. The character of the voice is that of the European Widgeon, but the whistle of the male is less harsh and piercing, and the bird seems less vociferous. The female is a silent bird, and ordinarily its note is never heard in autumn or winter. The male's note may be described as a soft, rather musical, Teal-like whistle, usually double and sometimes trisyllabic. The female's ordinary note, which is essentially that of the female European Widgeon, is a sort of grating croak, often represented as *grrr-grrr* or *karrr*. Major Allan Brooks told me that he had occasionally heard young females, when coming to decoys, uttering a rough croaking quack, — a rapidly repeated *ka-ka-ka*, almost chattering. I do not remember ever having heard this note myself.

The trachea is about 160 mm. long, and the tracheal bulb, which is ellipsoidal, faces to the left and front. It is markedly smaller than the same structure in the European bird, measuring about 17 mm. in its longest axis, by 12 mm. in its shorter axis.

Food. The Baldpate is very largely a vegetable feeder, and its food-habits in general bear a great resemblance to those of the Gadwall. But it is even less of a seed-eater than the latter, and depends largely on pond-weeds and wild celery for its sustenance. It also grazes on upland grass more commonly than any other American duck. Sportsmen have often remarked that the Baldpate is much more difficult to bait than the Mallard or the Black Duck. Nevertheless I have seen them come well to bait in a pond on Martha's Vineyard Island, Massachusetts. Audubon speaks of their alighting in cornfields in the South, and feeding on worms, insects and grain, but it is probable that the actual food was mostly grass sprouts.

The only exhaustive study of the Baldpate's winter diet was made by the U.S. Biological Survey, and was based on 255 stomachs collected between September

and April, mostly from Utah, Oregon and North Carolina, with contributions from 23 other States, 4 Canadian Provinces, Alaska and Mexico. The vegetable food averaged 92.23% of the total, and this in turn consisted of pond-weeds (42.82%), grasses (13.9%), algæ (7.71%), sedges (7.41%), wild celery and water-weeds (5.75%), water milfoils (3.48%), duck-weeds (2.2%), smart-weeds (1.47%) and various other items about (8.5%). By far the most important foods were the true pond-weeds (of various species) and widgeon-grass (*Ruppia maritima*). The few stomachs from southwestern Washington contained largely the leaves and root-stalks of eel-grass (*Zostera*), which is the principal winter food of the European Widgeon. The animal food, comprising 6.77%, is said to be unduly large on account of a group of birds from southern Oregon which had fed almost exclusively on snails. Fragments of small bivalves were found in 6 stomachs and snails in 29. The percentage of insects and crustaceans was negligible (Mabbott, 1920).

The stomachs of seven birds which I collected on Martha's Vineyard, Massachusetts, on December 1st, 1919, were examined by Mr. W. F. Kubichek of the U.S. Biological Survey. They contained nothing but sago pond-weed (*Potamogeton pectinatus*) and gravel, without any admixture of animal matter.

The summer food is undoubtedly very different in character, with a much larger proportion of animal matter. In Norton Sound, Alaska, they were found feeding largely on insects (Adams, in Baird, Brewer and Ridgway, 1884).

Courtship and Nesting. In Millais' (1902) opinion the display of the Baldpate is "precisely similar" to that of its European relative (see Plate 30). It has been described by C. W. Townsend (1916), and Mr. Harper, who has recently been collecting for me in the region about Lake Athabasca, has sent me some interesting field-notes. On April 11, 1920, the Saskatchewan River just below Edmonton was still frozen solid, except for a few pools of open water. Suddenly three ducks shot down from a great height and alighted on one of these pools. They had evidently just arrived from the south and were two males and a female. As soon as they had settled, the two former began to display. They "milled around, whistling excitedly *wheu wheu wheu*, and cocking up their wings in a remarkably coot-like manner. This tilting of wings reached ordinarily an angle of perhaps 45 degrees, but in the moments of greatest excitement it went probably to 60 degrees or even 70 degrees. At least once or twice the two males went for each other roughly, with bills working and wings heavily flapping the water. The female, meanwhile, was anything but passive. She, too, cocked her wings up to 45 degrees or so, and they were conspicuously crossed in this position. She kept up a purring, growling *grrr-grrr*, dabbed her head excitedly to one side, and nodded it vigorously." Mr. Harper suggests that the wing-raising may have some connection with the exposure of the black crissum and the white patch anterior to it.

The mating flight has been well described by Wetmore (1920) and was first seen by Mr. Harper on the Athabasca on May 21. It is certain that these flights do not take place until after the breeding grounds have been actually reached, and probably not until nesting has begun. As described by Wetmore (1920) this nuptial flight is performed with great dash and speed, even more than in the Gadwall, the males darting ahead of the females, setting and decurving their wings, and throwing their heads up, exhibiting their striking markings to the best advantage. Both male and female call constantly during this performance, and two males and a female invariably took part in what he calls the "display-flight."

The Baldpate is one of the late-nesting ducks, laying as late as the Gadwall or even later, and at about the same time as the Lesser Scaup. In North Dakota the average date for full clutches was about June 15 (Job, 1902) and Bent (1901-02) found very few eggs before June 1. Of course the seasons vary so much that only comparative dates are of much interest or value. During the spring of 1920, which was a late one, the first brood of young was seen on July 4 at the mouth of the Athabasca, but nests were discovered at the end of the first week of July (Harper, MS.). Even in the southern limits they breed late, in Utah mostly mid-May to mid-June and in Modoc County, California, a clutch of nine fresh eggs was found on June 20 (Grinnell, Bryant and Storer, 1918). On the other hand eggs were found as early as the end of May at St. Michael's, Alaska (Nelson, 1887). Preble (1908) found young unable to fly, north of Fort Rae, on August 1 and 4, and young in this condition have been seen as late as the middle of September in North Dakota (Coues, 1874).

The location chosen for the nest varies somewhat, but is commonly on high, dry ground, in wooded or brushy country. It is frequently at the foot of a tree and may be at some distance from the water (Nelson, 1887; Bent, 1901–02; J. and J. M. Macoun, 1909; Kennicott, in Baird, Brewer and Ridgway, 1884; F. Harper, MS.). Kennicott says that in Alaska he several times found single perfect eggs dropped on the bank of a river.

The normal clutch numbers from eight to twelve eggs, the average being about ten. The eggs are like those of the European Widgeon and cannot always be distinguished from those of the Gadwall. They are deep cream to nearly white in color and measure 51–60.1 mm. by 36.2–40.1 mm., the average being 55.1 by 38.8 (Grinnell, Bryant and Storer, 1918).

The period of incubation is the same as with the European Widgeon, that is, from twenty-two to twenty-four days, a good deal less than in the Mallard. Females with young employ the usual ruses for leading the intruder away from the brood by flapping along on the water until the family is considered safe. The males begin to flock together early in the breeding season, and even by July 6 they were seen in small bands in the Athabasca Delta (Harper, MS.), while Preble (1908) saw a flock composed entirely of males on the Slave River as early as June 30. Harper saw some

Allan Brooks -

Allan Brooks.

AMERICAN WIDGEON IN DISPLAY POSTURES

signs of incipient eclipse as early as July 1, the long central tail-feathers being apparently the first to be dropped.

STATUS. Figures showing relative numbers of this species shot in different regions probably do not give an accurate estimate of the actual numbers present, because the Baldpate is a wary bird and the flocks do not split up into small parties that are easy to decoy. The numbers taken at Long Point (Lake Erie) vary from 63 to 663 a year, this last high figure being for 1919. Between 1889 and 1905 out of a total of 95,049 ducks taken, 4848 (about 5%), were Baldpates, while from 1906 to 1920 out of a total of 61,063 the Baldpates numbered 4498 or about 7%. At the Monroe Marsh Club (west end of Lake Erie) the proportions were slightly higher. Out of 40,615 ducks taken between 1885 and 1901, 3383 (8%) were Baldpates. Even in the spring a good many used to be taken, the proportion running as high as 5.5% of the total. In this region there is no indication of recent decrease, either relative or absolute. The report of the Minnesota Game Commission for the years 1919–20 shows that from 30,000 to 120,000 Baldpates are taken in that State annually, which is from 3% to 12% of the total number of ducks killed there.

In northern New England they are known as rare ducks. In twenty years of shooting at Wenham Lake, Essex County, Massachusetts, they represent only 2% of the total bag. But south of Cape Cod they are found in abundance on Martha's Vineyard, Massachusetts, where perhaps 2500 birds spend the autumn months each year and occasionally winter there. They are extremely local and irregular southwestward along the coast, occurring on a few ponds in Rhode Island and in considerable numbers on Gardiner's Island, in Long Island Sound. They become really plentiful in Delaware, Virginia and North Carolina. At the Princess Anne Club, Virginia, they were third in order of abundance from 1894 to 1921 and averaged 15% of all ducks. At the Swan Island Club (Currituck Sound, North Carolina) they are also about the third duck in order of abundance and 4458 were taken there between 1909 and 1918. At the Narrows Isle Club, North Carolina, they have shown a decrease between 1886 and 1923, amounting perhaps to 20 or 30%. They average a little over 10% of all ducks shot there in thirty-eight years and the highest years were the winters of 1885–86, 1887–88, 1889–90 and 1903–04. The grand total killed was 5671. At the Currituck Club close by 11,441 Baldpates were taken in a total of 72,124 between 1888 and 1909, that is, about 16%, making it the third in order of abundance among the species of ducks killed; it was exceeded only by the Black Duck and the Mallard. From 1911 to 1917 there was a small decrease in the numbers taken and they have usually in this period been exceeded by Pintail and even by Gadwall. The greatest years were the winter of 1893–94, when 1029 were shot, and that of 1903–04 when over 1000 were taken. In South Carolina, at the mouth of the Santee River, the species is only moderately plentiful; here it is a little

more common than the Pintail, and is greatly exceeded by Mallard and Black Duck. It represents about 8% of all ducks shot in the thirteen seasons 1908–09 to 1921–22 at the Canaveral Club on the east coast of Florida. At St. Vincent's Isle, western Florida, it is said to be common, and the same is probably true of the whole Gulf Coast. McAtee (U.S. Biological Survey) says he never saw larger numbers anywhere than at Rockport (Port Bay), Texas, in December, 1910. In the Rio Grande valley, New Mexico, the Baldpate averages 5% of the ducks (Leopold, 1919).

Statistics for the Pacific coast are very meager. In the years 1910–11, 14,838 Baldpate were received by the American Game Transfer Company of San Francisco in a total of 71,793 ducks (20%). The Hunters' Game Transfer Company of that same city, handled during the years 1906 to 1911, 357,114 ducks, of which 62,798 (18%) were Baldpate. In Washington the Baldpate used to appear in October in tremendous numbers, 500,000 being estimated on the Nisqually Flats. But in the years just before 1909 it is said to have greatly diminished in abundance (W. L. Dawson and Bowles, 1909).

Kumlien and Hollister (1903) found it decreasing in Wisconsin; it represented only 2.5% of the ducks killed near Delavan between 1892 and 1899 (Hollister, 1920). Like other ducks the species has shown a marked increase as a breeding bird in the middle West since 1915, responding readily to increased protection, and it has been recorded by the Game Commissioner as nesting in unusual numbers in Minnesota in 1918. In North Dakota some of the U.S. Biological Survey collectors found it a rather rare breeder, but Bent (1901–02) says he found twelve nests in half an hour on an island in one of the larger lakes. In British Columbia, according to Major Allan Brooks (1918) this is one of the species that is on the increase in the interior, a result possibly of the increase of duck-weeds on the larger lakes. Harper's (MS.) estimates of its status as a breeding species in the Lake Athabasca region place it surprisingly low. He found it about seventh in order of abundance. In the Shoal Lake region of Manitoba the species is said to be growing very scarce (Taverner, 1919). In the Edmonton district of Alberta it is very plentiful and breeds commonly.

Enemies. Nothing specific is known.

Damage. This is probably less than with Mallards and Pintails on account of its preference for pond-weeds and open sheets of water.

Food Value. My personal opinion is that the Baldpates of Currituck, and even those killed on our Massachusetts ponds, are second only to the Canvas-back in its prime. Frank Forester extolled its virtues, and yet it is surprising to find how little it is appreciated in comparison with the Canvas-back or Redhead. Its great ad-

vantage for the table lies in its always being fat, averaging in this respect perhaps better than any other duck. Some have even classed it as better than the Canvasback (Baird, Brewer and Ridgway, 1884). On the Pacific coast, however, it is not always so "tasty," and does not enjoy so high a reputation.

HUNT. On large waters Baldpates are extremely hard birds to take in any numbers. They do not scatter evenly over a marsh as some species do, and it is seldom that a gunner will find himself in the right place for a large kill. Then, too, they fly high, and are too sharp-eyed to be fooled by bush-blinds and floating batteries (or sink-boxes) in the deep-water sounds. The uncertainty of their behavior makes them exceedingly interesting to the sportsman shooting over wooden decoys. Their habit of circling many times and whistling loudly gives him a chance to test his ability to coax them in by imitating their whistle. As with the Pintail, one gets mostly long, hard shots, but Baldpate are comparatively tender ducks and are easily knocked down by small-sized shot.

BEHAVIOR IN CAPTIVITY. Baldpates have always been sporadically kept in American collections and do well in captivity. So far as I know they were not bred until recent years, when Mr. John A. Cox of Brewster, Massachusetts, reared some, according to Job (1915). They are one of the most interesting and beautiful ducks for an ornamental pond, for besides their stylish appearance and rather musical notes, they are always active, and their vivacity keeps the other birds alert.

Their absence from European collections seems quite remarkable. The species is not included in the 1896 list of animals in the London Gardens, and it was apparently not kept there even in 1911. But it was imported for the Duke of Bedford and Mr. W. H. St. Quintin bred it on his estate at Scampston. It was there that Sir Richard Graham obtained stock for his well-known experiments at Netherby. The Right Honourable Earl Grey of Falloden writes me that his Baldpates have interbred freely with the European Widgeon, but this is the first instance of this cross that I have heard of, and I have never seen such hybrids described. Mr. Hugh Wormald showed me some fine breeding pairs at his ponds in East Dereham, Norfolk, in the spring of 1922, and during that season one of his females laid three separate clutches although only five eggs out of the whole lot were fertile. This stock was a good deal inbred.

So far as I know the American Widgeon has not been much kept on the Continent but the Berlin Gardens had specimens which bred for the first time in 1909 (Heinroth, 1910a) and Mr. F. E. Blaauw (*in litt.*) has also bred them in Holland.

HYBRIDS. Wild hybrids between the Baldpate and other species seem to be unusually rare. Only crosses with the Mallard and with the Gadwall have been

recorded (Suchetet, 1896). In captivity Millais (1913) says it has mated with a hybrid between a Baldpate and a Mallard.

In 1920, Mr. H. K. Job reared a fine family of hybrids from a Pintail female by a male Baldpate. He sent me the three males, one of which is now preserved as a specimen in the Museum of Comparative Zoölogy, in Cambridge, while the two others are still (1922) on my pond. At the Tring Museum I saw a specimen bred at Regent's Park between this and the Bahama Duck.

CHILIAN WIDGEON

ANAS SIBILATRIX POEPPIG

(Plate 29)

SYNONYMY

Anas sibilatrix Poeppig, Froriep's Notizen, vol. 31, p. 10, 1829.
Anas chiloensis King, Proc. Zool. Soc. London, 1830, p. 15.
Mareca chiloensis Eyton, Monograph Anatidæ, p. 117, 1838.
Anas parvirostris Merrem, in Ersch and Grube's Encyclop., sect. 1, vol. 35, p. 43, 1841.
Sarkidiornis sibilatrix G. R. Gray, Genera of Birds, vol. 3, p. 605, 1845.
Chaulelasmus chiloensis Lichtenstein, Nomenclator Avium Mus. Berol., p. 101, 1854.
Mareca sibilatrix Sclater and Salvin, Proc. Zool. Soc. London, 1876, p. 395.

VERNACULAR NAMES

English: Chiloë Widgeon, Chilian Widgeon.
German: Chilenische Pfeifente, Südamerikanische Pfeifente.
French: Siffleur du Chili, Marèque du Chili.
Spanish: Pato real, Pato overo, Chiriri.

DESCRIPTION

ADULT MALE: Front part of head white; crown and posterior part of cheeks, throat and neck, very dark brown to black. Behind the eyes a very beautiful metallic-colored patch of green and purple, extending back on to the occiput and hind neck. Mantle and scapulars black, the former barred, and the latter edged with white. Back black; rump and upper tail-coverts white; tail black. Breast barred with black and white; abdomen white. Flanks and under tail-coverts bright rust color. Wing with a conspicuous white patch on median and greater coverts. A black band on the greater coverts borders the speculum, which is black with a slight iridescence. Tertials long and pointed, black, bordered with white edges and iridescent, the inner tertial broadly margined with white on the outer web. Under wing-coverts grayish, axillars gray.

Iris dark brown. Bill bluish to blue; black at the tip and along a line at the base of culmen. Legs and feet grayish to blackish.

Wing 255–275 mm.; bill 35–36; tarsus 40–43.

ADULT FEMALE: Plumage same as in male; soft parts as in male.

Wing 237–245 mm.; bill 35; tarsus 40.

YOUNG IN FIRST PLUMAGE (before primaries are grown): At this stage the buff-colored downy patch is still present back of the eye, the occiput is black and the forehead gray. The mantle, back and scapulars, as well as the rump and tail are a dull brown. The breast begins to show the barring of the adult, while the rest of the lower surface is pure white. The flanks are barred white and black and lack the rich buff feathers of the adult.

YOUNG IN DOWN: The young of all three species of Widgeon vary a good deal in color and that of this species is very close indeed to that of the European Widgeon. Sometimes it is even more rusty red in color on the head but at other times the head color is about the same. The body spots are rather prominent, especially the rump spots. It is easily told from the young of the American Widgeon by the rusty-pink color of the head.

Note: There is no return to a simpler (eclipse) plumage in summer.

DISTRIBUTION

THE Chiloë Widgeon, which is found throughout the southern part of South America, seems to be essentially a non-migratory species, though in the northernmost parts of its range it appears to be a winter bird only. It is not a common duck north of the latitude of Buenos Aires, but is said to have occurred in Paraguay (H. and R. von Ihering, 1907) and in the Argentine as far north as Tucuman (Dinelli, *fide* Dabbene, 1910). It has occurred in the extreme southeastern part of Brazil, near Rio Grande (H. and R. von Ihering, 1907) and has been taken in Uruguay in the Cerro Largo and Canelones Provinces (Tremoleras, 1920). From northern Argentina it has been recorded not only from Tucuman, but also from Cordoba (Schultz, *fide* Dabbene, 1910) and Mendoza (H. Burmeister, 1860) where it is said to be common (Reed, 1916). Farther east and south it is found to be a very common bird in the Province of Buenos Aires during the winter (Hartert and Venturi, 1909; de Beauquesne, 1911; H. Burmeister, 1872; Withington, 1888), some remaining to breed in the southern parts of the Province (Durnford, 1878; E. Gibson, 1920). Throughout Patagonia it is a plentiful species, especially in the eastern parts. Mr. J. L. Peters, collecting for me, found it also fairly common in western Patagonia. Durnford (1878) found it breeding in great numbers at the mouth of the Sengelen, in Chubut, and Doering (1881) recorded them on the Rio Colorado and Rio Negro. Oustalet (1901) says they are resident on the Rio Gallegos in southern Patagonia, but Tierra del Fuego they seem to visit only during the breeding season. Crawshay (1907) found them quite common on that island at San Sebastian and in Useless Bay, while Blaauw (1916a) came across them at Estancia Sarita. There seem to be no records for southern Tierra del Fuego.

Paraguay
Brazil
Uruguay
Argentina

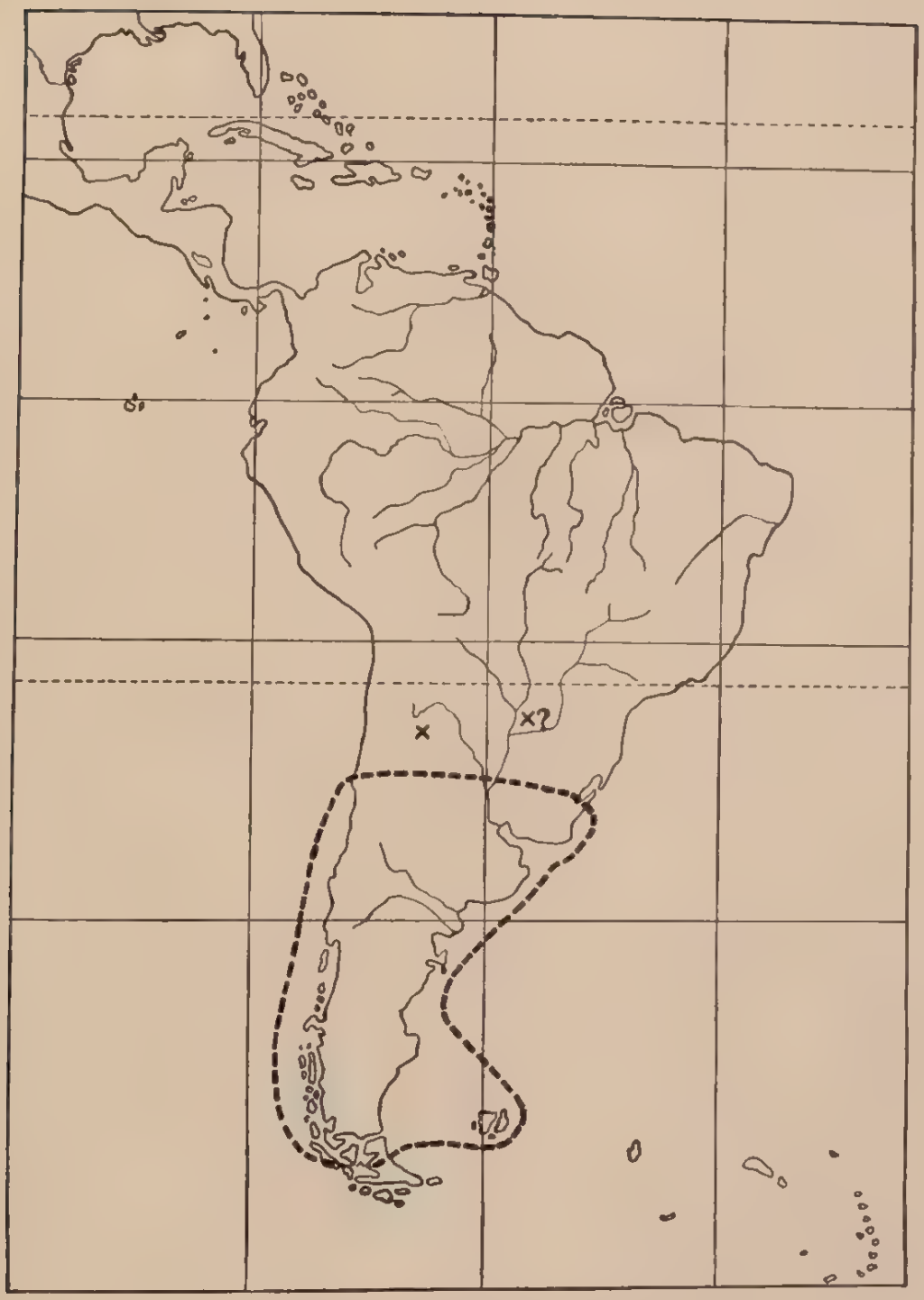
Falkland Islands Abbott (1861) and more recently Beck (MS.) found the Chiloë Widgeon on East Falkland where the species breeds, but is very scarce.

In Chile this duck is found north to about the same latitude as in Argentina. Cunningham (1871) took a few in the breeding season at Gregory Bay (Straits of Magellan) and throughout southern Chile it is a common bird, especially about Chiloë (Lane, 1897; Schalow, 1898; Quijada, 1910). North of Valdivia it seems to be a rarer bird (Lane, 1897), but there are records for Concepcion (Schalow, 1898), Santiago (British Museum; Blaauw, 1916a), Colchagua (Lataste, 1895) and even Coquimbo (R. B. Sharpe, 1881). These more northern records are mostly winter occurrences.

Chile

GENERAL HABITS

HAUNTS. From the meager field notes available for the study of this bird, there seems to be little difference between it and its relatives of North America and the Old World. It appears to be essentially a fresh-water species, frequenting the large open lagoons rather than small pools or streams (Durnford, 1878) and in any case preferring open water to rushy swamp localities (E. Gibson, 1920). Mr. J. L. Peters (MS.) found it usually on the *arroyos* and lagoons of the prairies in western



MAP 44. Distribution of Chilian Widgeon (*Anas sibilatrix*)
Sporadic records indicated by crosses (×)

Patagonia. Though it is found chiefly on lagoons and rivers even in Chile (Quijada, 1910) and has been seen there even on a mountain stream (Blaauw, 1916a), I suspect that it may be more coastal on the Pacific side of the Andes. At any rate it is an abundant bird on the Chiloë Islands, whence it gets its English name.

Wariness. Like the European Widgeon and the Baldpate this species is in general a wild and wary bird (Abbott, 1861; Durnford, 1878; P. L. Sclater and Hudson, 1889; E. Gibson, 1920) but at the same time it seems to become tame very quickly in places where unmolested. Crawshay (1907) speaks of it as the wildest of all ducks in Tierra del Fuego, but he tells of a pool of water kept as a sanctuary, some hundred yards from the manager's house at Useless Bay Settlement, where sometimes as many as twenty or thirty Widgeon could be seen and conveniently watched.

Daily Movements. In districts where it feels secure this Widgeon feeds by day as well as at night, and even in the southern part of the Province of Buenos Aires it is said to be the first to fly to the feeding grounds in the evening, and the last to leave them in the morning (de Beauquesne, 1911).

Gait, Swimming, Diving. I never made any notes on the only pair of this species which I kept in confinement. It is essentially "Widgeon-like" and there is nothing characteristic in its movements. Like its relatives in North America and in Europe it is a very vivacious and agile bird (de Beauquesne, 1911) but presumably never dives excepting when wounded. I am told by Mr. J. L. Peters that even when winged it does not ordinarily dive.

Flight. The Chiloë Widgeon is a powerful flier (P. L. Sclater and Hudson, 1889; E. Gibson, 1920) and probably does not differ at all in this respect from its congeners. The flocks are usually small, numbering from ten to twenty (P. L. Sclater and Hudson, 1889; de Beauquesne, 1911; E. Gibson, 1920), in autumn on migration running as high as thirty or forty (E. Gibson, 1920) and occasionally, perhaps in winter when flocks are more closed, numbering as many as from one to two hundred (P. L. Sclater and Hudson, 1889). I do not know whether this Widgeon has the characteristic "fluttering" action during flight common to the others. I presume it has but Mr. Peters was quite certain he did not hear it.

Association with other Species. Like other Widgeon this species is not often found in close company with other ducks (E. Gibson, 1920), but at the mouth of the Chubut River it has been seen feeding together with the Brown Pintail (Durnford, 1878). Mr. Peters tells me that in western Patagonia he found it quite commonly

in the company of this Pintail, though the Widgeon always stayed together even in such mixed flocks.

VOICE. According to Rogeron (1903) the note of the male is the same as that of *Anas penelope*, and Lane (1897) also speaks of it as a "Wigeon-like whistle." P. L. Sclater and Hudson (1889) describe it as three or four long clear whistling notes followed by another, and concluding with a kind of flourish, and de Beauquesne (1911) speaks of three notes of greater fullness and softness than those of the European Widgeon. A mated pair seen flying about in November uttered a high-pitched nasal *quack* and occasionally a grunt in the same tone. Mr. Peters, to whom I am indebted for this note, thinks both sexes uttered this cry, but I must say that this seems to me unlikely. Heinroth (1911) says the note of attraction of the male, though very similar to that of *Anas penelope*, can nevertheless be distinguished from it and he notes that, in contrast to most other ducks, the female's voice, which is a rather weak rattle, is much softer than that of the male.

The trachea is about 155 mm. long and the tracheal bulb, which faces to the left and forward, is roughly spherical and very large. It is 25 to 28 mm. long and 20 to 22 mm. broad. In other words this remarkable structure is about three times as large as that of the European Widgeon and perhaps five times the size of the American Widgeon's.

FOOD. Very little is known of the feeding habits of this species. Durnford (1878) saw the birds feeding on the extensive mussel-beds at the mouth of the Chubut, and A. H. Holland (1892) says they feed on high ground among dry thistles, or even in the open. No doubt they are to some extent upland feeders like their relatives, and it is doubtful whether they ever take much coarse animal food. Crawshay (1907) found grass in the stomach of a specimen shot in Tierra del Fuego and in captivity they graze like *Anas penelope* (Rogeron, 1903).

Mr. Peters collected eight stomachs at Huanuluan, Rio Negro Province, between August 25 and November 12, 1920. These contained nothing but vegetable matter and gravel. The shoots of a rush (*Juncus*) were by far the most important food and were present in five stomachs in large amount. Water crowfoot (*Batrachium*) was well represented in three stomachs (96 to 100%); and there were a few seeds to as many as 150 seeds of water milfoil (*Myriophyllum*) in six stomachs; sedge (*Scirpus americanus*) was poorly represented in only two of them (examination by U.S. Biological Survey).

COURTSHIP AND NESTING. Like the other Widgeon this is a late nester, certainly much later than *Anas spinicauda* (Peters, MS.). The season varies of course with the locality. According to de Beauquesne (1911) Widgeon are paired by August or Sep-

tember in the southern part of the Province of Buenos Aires, and they were found paired in the same months in western Patagonia (Peters, MS.). In the former region they seem to breed in November (A. H. Holland, 1892) but in the great breeding areas (central and southern Patagonia) the season is naturally somewhat later: late December and all through January (Scott and Sharpe, 1912). Mr. Peters took a nest and eight eggs in western Patagonia in November and does not think the species nests there as late as January. Young just hatched were seen in the Falklands on December 13 (Beck, MS.).

According to Heinroth (1911) there is very little in the way of display, but observers in the field have noticed certain social plays on the water and particularly antics in the air, which are undoubtedly nuptial flights. Crawshay (1907) who watched them in Tierra del Fuego, says: "They would hold a merry tourney on the water, chasing and ducking one another, gaggling excitedly, all joining in excited approbation or derision from time to time. One bird would then take wing, followed by all the others, for a turn in the air, and then they would career round in reckless dashing flight — wheeling, twisting, doubling, stooping and rising — to return to the water with a sounding splash." But this remarkable exhibition in the air was first and most picturesquely described by Hudson (1876; also P. L. Sclater and Hudson, 1889; Hudson, 1892): "A dozen or twenty birds rise up until they appear like small specks in the sky, and sometimes disappear from sight altogether; and at that great altitude they continue hovering in one spot, often for an hour or longer, alternately closing and separating; the fine bright, whistling notes and flourishes of the male curiously harmonizing with the grave measured notes of the female; and every time they close they slap each other on the wings so smartly that the sound can be distinctly heard, like applauding hand-clasps, even after the birds have ceased to be visible." In western Patagonia four birds were observed performing this erratic nuptial flight on September 11 (Peters, MS.). The "slapping" sound, produced by a contact in the air, has been noticed in other species of ducks.

Very little is known of the location of the nest, but Durnford (1878) and P. L. Sclater and Hudson (1889) say the birds nest among the reeds on extensive marshes and A. H. Holland (1892) goes so far as to say that the nest rests on the water and is supported by dead vegetation. If this situation is the normal one it is certainly unlike that of the other Widgeons, which are both apt to nest on high, dry ground. A nest found in western Patagonia was in a hummock on the marsh (Peters, MS.).

The clutch seems to be rather small, varying from six to nine, the normal number being apparently eight. The eggs are pure white to cream color, sometimes rather whitish brown (P. L. Sclater and Hudson, 1889; E. W. Oates, 1902; Wells, *fide* E. Gibson, 1920). Mr. Peters tells me that the eggs are indistinguishable from those of the Brown Pintail, but the Widgeon has black nest-down while that of the Pintail is gray. In size they vary from 53.8–61.0 mm. by 39.9–42.0 mm., the average of

thirteen eggs being 58 by 40 mm. The exact incubation period appears to be unknown, but it is probably the same as that of the other Widgeon, namely, twenty-four days. Mr. Wormald's captive-laid eggs hatched in twenty-three to twenty-five days. In the Berlin Gardens a Brown Pintail that was paired with a Chiloë Widgeon took twenty-four days to hatch the eggs (Heinroth, 1908).

A characteristic of the present species is the fact that the male seems to concern himself with the young. This of course is not the case with the European Widgeon or the Baldpate, and has some connection with the fact that in the Chiloë Widgeon both sexes have the gaudy plumage. Heinroth (1911) noted that a male mated with a female of the Brown Pintail took a great interest in the young, and he says the attachment between the sexes in this species is particularly noticeable. The males, he asserts, will even protect the young of other species. Mr. Peters, however, did not find any male in the vicinity of a nest which he took in western Patagonia early in November, so that we do not yet know whether the male always stays with the brood. I suspect, however, that such is the case.

STATUS. Of this we know nothing accurate. All ducks have diminished in Argentina, especially in the Province of Buenos Aires. While J. L. Peters was collecting in northwestern Patagonia and a few other points in Argentina he estimated that this duck ranked about 5 to 10% of all ducks. The Brown Pintail outnumbered the Widgeon at least ten to one and represented at least 80 to 85% of the duck population of those regions. The Widgeon ranked second to the Pintail and was next to the Varied Teal (*Anas versicolor*).

ENEMIES. In northwestern Patagonia, Peters did not find enemies of water-fowl common. The only hawks there, a marsh hawk and a *Buteo* or hen hawk, did not disturb ducks. The former was living on small rodents and the latter on lizards. The crow tribe was not represented at all and fish were absent from the sloughs and marshes. A Caracara Eagle, which he saw attack a small lamb, might possibly take ducks at times, but from the nature of the bird this seems doubtful.

DAMAGE. Nothing recorded.

FOOD VALUE. Like the other Widgeon this species is highly valued as an article of food (de Beauquesne, 1911; and others), and is as good eating as any Argentine duck (Peters, MS.).

HUNT. Little need be said on this point. Its excellent flesh makes the bird a very desirable addition to the bag, but it is so wary that a sportsman may feel justifiable pride in bringing in one or two (E. Gibson, 1920). Still, in winter it is regularly

found in the Buenos Aires Market, or at least it used to be in the past (H. Burmeister, 1872). Crawshay (1907) says that when flushed the Widgeon usually makes a detour and comes back overhead, sometimes again and again, often so high as to be quite out of gunshot. They flush wider than the Pintails, who, however, quickly follow their example (Peters, MS.).

Behavior in Captivity. So far as I know the Chiloë Widgeon has never been bred in captivity in this country. It has been kept in the New York Zoölogical Gardens and the price in America has been about $9.00 each. It was commonly kept in collections of water-fowl before the War but now it does not seem to come to our bird markets. After careful enquiries in Buenos Aires in 1920, J. L. Peters failed to find any one who was dealing in live water-fowl.

The species seems to have been first introduced into England in 1870, when the London Gardens received specimens from Chile. These began to breed the following year and continued to do so almost every year thereafter. The dates of hatching are mostly for late May and the first half of June (P. L. Sclater, 1880), and the reversed seasons did not disturb them in the least. Among amateur aviculturalists who have bred this species in England may be mentioned Miss Hubbard (1907), Mr. Wormald and Earl Grey of Falloden (*in litt.*). The earliest date of nesting in England is April 27, which is neither very early nor very late.

On the Continent this duck seems to have been introduced in the late seventies, and it evidently became very popular. M. Courtois (1880) bred them in France, two of his pairs laying forty-four eggs, of which twenty-two hatched. In 1881, M. Gourraud (1881) succeeded in breeding them and in 1884 M. Montlezun (1884) had a female incubating. She began to lay on May 11 and deposited an egg every other day. On May 28, 29, and 30 she remained on the eggs at night and began plucking feathers. Then she sat regularly, leaving only three times a day. She was finally disturbed by some Mandarin Ducks which broke the eggs after she had left. The species also bred in the Gardens at Tours in 1884 (Noenty, 1884) and Rogeron (1903) seems to have been raising them regularly in more recent years. In 1922, Monsieur J. Delacour succeeded in raising nineteen ducks from twenty-three eggs, a really remarkable performance.

In Berlin a number of specimens were kept in the Zoölogical Gardens, but apparently no young have been reared. Most of the birds there appear to mate with other species, and one pair that had mated produced about twenty-two eggs in eleven days each year, but these proved infertile (Heinroth, 1911).

On the whole the Chiloë Widgeon is a very desirable bird because of its great ornamental value, its vivacity and good temper. It is as hardy as most ducks for thirty-seven specimens in the London Gardens averaged four years, the maximum being over fifteen years (P. C. Mitchell, 1911). They are fond of greens and are said

to be more herbivorous than either the Carolina Duck or the Mandarin (Montlezun, 1884), but they also require some animal matter. Miss Hubbard (1907) says one of her specimens was found choked to death with the tail of a field mouse protruding from its bill!

The only pair which I ever kept, lived several years but did not nest. Of course dealers are usually unable to pick out the sexes, so that one is extremely likely to receive two birds of one sex. The would-be purchaser should try to get good young hand-reared stock as it is much more likely to breed than wild-trapped, imported birds. Hand-reared birds are worth about £5 per pair in England at this time. They do not seem to breed until their second year but this does not necessarily hold for wild birds under natural conditions.

Hybrids. Crosses between the Chiloë Widgeon and other species are rare. None has ever been taken in the wild so far as I know, and in captivity only the cross with the Brown Pintail is at all common. The offspring of this cross prove sterile. One case of crossing with the Mallard has been recorded (Poll, 1911), and Finn (1900) says it has been crossed with the European Widgeon, in the London Gardens. Shaw-Bailey (1918), who has repeated this experiment, says the hybrids from this cross are almost indistinguishable from the American Baldpate, a result that is of great interest to students of evolution.

EUROPEAN TEAL

ANAS CRECCA LINNÉ

(Plate 31)

SYNONYMY

Anas crecca Linné, Systema Naturæ, ed. 10, vol. 1, p. 126, 1758.

Querquedula crecca Stephens, General Zool., vol. 12, pt. 2, p. 146, 1824.

Nettion crecca Kaup, Natürl. Syst., p. 95, 1829.

Querquedula subcrecca Brehm, Oken's Isis, 1830, col. 998.

Querquedula creccoides Brehm (*nec* King), Oken's Isis, 1830, col. 998.

Boschas crecca Swainson, Classification of Birds, vol. 2, p. 367, 1837.

Anas rubens Lesson (*nec* Gmelin), *fide* Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.

Querquedula crecca, a. *rubens* Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.

Dafila crecca Stejneger, Proc. U.S. Nat. Mus., vol. 10, p. 136, 1887.

VERNACULAR NAMES

English: Common Teal, European Teal, Green-winged Teal.

French: Sarcelle d'hiver, Sarcelline, Petite sarcelle, Arcanette, Trufleur, Criquet, Morêt, Maraton, Biganon.

German: Krickente, Kriekente, Kriechente, Krugente, Kleinente, Franzente, Schapsente, Spiegelente, Kreuzente, Schmielente, Halbente, Kugelente, Zwergente.

Gaelic: Crann-lach, Crion-lach.

Dutch: Wintertaling, Teling, Krik.

Danish: Krikand, Kraekand, Norkand, Rödnakke, Tagand.

Swedish: Krickand, Kricka, Kräcka, Arta, Knipann, Knortann, Lortand, Lorstboll, Beckasinand, Hästlodand.

Norwegian: Krikand, Lortond, Saurond, Pytand, Sirku.

Icelandic: Urtönd, Ört.

Lapplandic: Ciksa.

Finnish: Tavi, Tavallinen tavi, Likatavi, Prittisuorsa.

Russian: Chirok, Chirsk, Gurka.

Hungarian: Opra recze, Kisebb csörgö kacsa.

Croatian: Patka krzulja.

Czech: Cirka obecna.

Slavonian: Chrapacka mensja.

Esthonian: Piri part, Muda part.

Lettish: Krihklis lohshne.

Italian: Alzavola, Garganella, Crecoleta, Germanello, Anitralla, Tersetola vernile, Sarsella, Mallardella.

Sardinian: Anadone, Circuredda.

Spanish: Cerceta hiemal, Zarzeta, Serrano, Garcetilla real, Patrico, Salcet.

Portuguese: Marreco, Marrequinho, Marneco.

Arabic: Bat-kerkedj, Shershir.

Maltese: Sarsella.

Turkish: Kirki ordek.

Georgian: Kokpa ichwi.

Tartar: Geraep, Sirgei-urdak.

Bashkirs: Tyragai.

Ostiaks: Shigirtpiri.

Lamut: Kuritsh.

Hindustani: Lohya kerra, Chota murghabi, Putari, Suchuruka.

Nepalese: Baigilagairi.

Sindi: Kardo.

Canarese: Sorlai-haki.

Bengali: Naroib, Tulsia-bigri.

Japanese: Kogamo.

Corean: Ugalgapyl.

Kuriles: Tuuriwe.

Kamchatka: Peshukun.

Alaska: Ting-a-zo-me-ok.

DESCRIPTION

Adult Male: Head and upper neck rich chestnut; an iridescent patch of green and purple extending back from the eye to the nape on each side. From the gape along base of culmen and over the eye a buffy stripe. A narrow white line separates the green eye-patch from the chestnut of the face. Chin black; hind neck purplish black; mantle finely vermiculated with black and white; scapulars the same, except the outer ones which are ornamented with longitudinal black and white stripes. Back and rump gray-brown; upper tail-coverts edged with buff; tail brown; lower neck finely vermiculated; breast heavily dotted with round black spots. Remainder of lower surface white except the flanks which are like the mantle, and the sides of the rump which have a black crescentic mark and

EUROPEAN TEAL

Female Male

AMERICAN GREEN WINGED TEAL

Female Male Adult Male Adult Female

a buffy patch. Under tail-coverts black. Outer wing-coverts plain blue-gray, except the greater ones which form a conspicuous buffy anterior wing-bar. This bar may be white, and is always lighter externally than internally. Speculum black externally and green internally, with a narrow buffy posterior wing-bar. Primaries brown. Outer tertial forming a black edge to the speculum, the rest nearly plain brown. Under wing-coverts gray and white, axillars white.

Iris dark brown. Bill black or nearly so. Legs and toes gray, greenish or brownish, with the webs nearly black.

Wing 175–188 mm. (as long as 193 according to Hartert); bill 34–38; tarsus 29–33.

Weight 8 to 12 ounces (0.22 to 0.34 kilograms).

Adult Female: Brown above and cream-colored below. The edges of the feathers of the mantle and scapulars are lighter brown and the mantle is irregularly barred. Top of the head dark brown; cheeks buff, finely spotted with dark brown, chin and throat sometimes immaculate, but usually spotted like the cheeks An indistinct postorbital stripe of dark brown can usually be made out. Breast spotted; rest of lower parts whitish, with indistinct spots or streaks. Flanks mottled; wing as in male but the speculum lacks the black border formed by the ornamental tertials.

Iris same as in the male. Bill not so dark-colored. Tarsus greenish or brownish gray as in the male.

In summer the under parts are more spotted, due to wear at the tips of the feathers.

Wing 165–175 mm.; culmen 33–36; tarsus 28–32.

Female in First (Juvenal) Plumage: Very much like the summer adult, but the lower abdomen is more indistinctly spotted and streaked. The mantle is inclined to be more uniform in appearance, and the tail-feathers are always blunt at the tips. The top of the head is usually darker, the feathers lacking most of their light edges, but none of these color characters appears constant except the abdominal spotting which easily separates the young female in August from the adult female in winter. It is more difficult to tell the young female from the breeding female except by the obvious signs of wear in the latter.

Male in First Plumage: At first not to be distinguished from the female but by September or October one or two of the following characters will be present: a well-marked black internal border to the speculum; light-colored, wavy bars on the mantle; a few indistinctly vermiculated feathers on the mantle or scapulars; one or two round spots on the breast; or one or two vermiculated feathers on the lower flanks. The spotting of the abdomen usually vanishes by September and by November the young male is rapidly putting on his adult dress. The complete dress is probably seldom perfect before March. Millais (1902) maintains that males in first plumage may be distinguished from young females by the bluer gray color of the shoulder of the wing, and the brighter color of the green speculum, but this I cannot agree with.

Male in Eclipse: I have no specimens at hand, but I suspect that European Teal in this plumage cannot be told from the American Green-wing with whose eclipse plumage I am familiar.

Downy Young: In general appearance like the young of the Mallard but darker, especially on the top of the head and on the back. There is a dark streak through the eye, a dark ear-patch and a superciliary light streak. The cheeks are rather richly colored and the light spots on the body and wings are small. New-hatched young are of course exceedingly small.

DISTRIBUTION

THE Common Teal is a palæarctic species widely distributed through Europe and Asia, wintering also in Africa and straggling to North America. Its breeding range may be roughly described as lying between the 35th and 73d parallels of north latitude, and this in itself is quite remarkable for extent. Within this area it has been found breeding in Iceland, where it has been recorded many times, earlier records being summed up by the most recent writer, Hantzsch (1905). According to him it is not rare in Iceland and apparently has a rather wide distribution in that island. H. C. Müller (1869) states that it is not uncommon in summer on the Faroes, and he believes that some may breed. It nests on the Shetlands (R. Gray, 1871; Saxby, 1874) and farther south is known as a common breeder through Scotland (R. Gray, 1871). According to Stonham (1908) it is even increasing as a breeder in the Outer Hebrides. In England it nests more sparingly, becoming almost rare as a breeder in the southern counties (Seebohm, 1885; F. O. Morris, 1903; Millais, 1902; etc.); but it is apparently abundant in Wales (Stonham, 1908). It is known as a breeder in Ireland, whence it has been recorded nesting in suitable localities in every county (W. Thompson, 1851; Ussher and Warren, 1900).

Iceland

Faroes

Shetlands

Scotland

England

Ireland

On the Continent the species breeds in suitable places throughout Scandinavia, where it is found even in the mountains. Representative authorities for Norway are Collett (1873) and Schaanning (1913). Sommerfeldt (*fide* Dresser, 1871–81) has reported it from Varanger Fjord in the extreme north in summer. For Sweden we have the testimony of many writers, among them Nilsson (1858) (South Skane) and Wallengren (1854) (Gotland). Apparently the species is everywhere a common breeder in the Scandinavian peninsula. In Finland and Lapland also, it appears to be exceedingly abundant. Records for Lapland include, among others, those of Nilsson (1858), Suomalainen (1912) (Lapland Enontekiensis, 22° east longitude, 68° 30′ north latitude) and Finnilä (1913) who recorded it from Sodankyla (68° north latitude, 28° east longitude), Malmgren (Enare-Lapland, 69°) and von Nordmann (1864) (Lapland to the Arctic Sea). Pleske (1886) speaks of the species as a common breeder in the Kola Peninsula and adduces many authorities for the statement. In Finland it breeds everywhere, according to Palmén (1876) as far north as Utsjoki, 69° 30′, which of course includes Lapland. It is a very common breeder in central Finland (Suomalainen, 1908), and nests also in eastern Finland (Schaanning, 1907), as well as in the northern parts (Dresser, 1871–81). In Denmark it has been recorded breeding by Kjärbölling (1850). Dubois (1912) states that it nests in Belgium and the same is true of Holland (Schlegel, 1859). It breeds in the greater part of France, perhaps throughout the whole of the country (Ternier and Masse, 1907; Paris, 1907). W. E. Clarke (1895) states that a few are said to breed in the Rhone Delta, and l'Hermitte (1916) says that some are resident in Provence, but I have been unable to find any proof of its breeding in southwestern France. Tait (1887) says he was told of its nesting at Angeja and near Tuey in northern Portugal, but he was unable to substantiate this statement from personal experience. Its breeding in southern Spain seems to be certain, for though Irby (1875) was not sure that the species was "resident" there, H. Noble (1902) succeeded in finding a nest in Andalucia. A. Chapman and Buck (1910) state that it is a rare breeder, presumably on the *marismas*, while H. Saunders (1871) also says that a few breed, referring, I suppose, to Andalucia. The Teal breeds in the Azores archipelago on Flores (Godman, 1870) and on San Miguel (Chaves, *fide* Hartert and Ogilvie-Grant, 1905). Harcourt (1851) says it nests in Madeira, and Thanner (Ornith. Monatsb., vol. 17, p. 31, 1909) has recorded its nesting on Fuerteventura in the Canaries. According to Salvadori (1865) and Giglioli (1889–91) a few breed in Sardinia, but Brooke (1873) says many do so. As far as I know, it has never been recorded breeding in Corsica. Malherbe (1848)

Norway

Sweden

Finland

Lapland

Denmark

Netherlands

France

Spain

Azores

Canaries

Sardinia

Corsica

MAP 45. Distributi

Breeding range, d

n Teal (*Anas crecca*)
range, broken line

was long ago told of nests near Syracuse and Catania in Sicily, while C. A. Wright (1864) has more recently recorded it as being occasionally met with in June in Malta, hence possibly breeding. Despott (1917) says it is fairly common at all seasons on Malta, but he makes no reference to its breeding. It certainly nests in various parts of Italy, and Giglioli (1889–91) quotes statements for its occurrence as a breeder in Calabria, Tuscany, Venice, Lombardy and Piedmont. Soffel (1915) says it breeds on Lago Maggiore, and according to Bailly (*fide* Dresser, 1871–81) it is "resident" in Savoy. In Switzerland it breeds throughout in suitable localities (Fatio, 1904), and the same is evidently true of Germany. For this latter country we have testimony of its nesting in Schleswig and Mecklenburg (Dahl, 1905), in Mecklenburg (Wüstnei, 1902), in Oldenburg (von Negelein, 1853), in the Rhine Provinces (Le Roi, 1906–07), at Neuwied (Brahts, 1855), Lorraine (von Besserer, 1899), in Bavaria (Jäckel, *fide* Naumann, 1896–1905), in Saxony (Heyder, 1913), in Lusatia (Hantzsch, 1903), in Brandenburg (Schalow, 1915), in Pomerania (T. Holland, 1857) and in eastern Prussia (Hartert, 1892). The species also breeds (but only very sparingly) in the southern parts of what was formerly the Dual Monarchy. Fritsch (1872) says it is abundant in Bohemia in summer, and Madarász (1884) states that it breeds at Neusohl (Hungary). Farther south, Crown Prince Rudolf and Brehm (1879) have recorded its nesting near Vienna, and von Mojsisovics (1887) and Rössler have reported it breeding in Slavonia. Danford and Harvie-Brown (1875) found it common everywhere in Transylvania in May. From the Balkans we have records of its nesting in Bosnia, Herzegovina, and Montenegro (Bielz, *fide* Naumann, 1896–1905; Reiser and von Führer, 1896), Bulgaria, not far from Sofia (Hristovic, *fide* Reiser, 1894) and in parts of northern Greece (Lindermayer, 1860). Sladen (1917) speaks of it as resident and probably breeding in Macedonia, and Lintia (1909) has reported its breeding in Rumania. According to Sintenis (1877) it is a very common breeder in the Dobrudja. It undoubtedly breeds about Constantinople, for G. C. Taylor (1872) found it abundant in late May at Ismid.

Italy **Switzerland** **Germany** **Austria Hungary** **Balkans** **Turkey**

In European Russia and Poland the species seems to occur everywhere as a breeder. Representative records are the following: according to Taczanowski (1888), very common in Poland in the summer, and a common breeder in the Baltic Provinces, Kurland, Esthonia and Livonia (Loudon, 1909); a few breed in Pskov (Zarudny, 1910); abundant in the whole of the Petrograd Government (Büchner, 1885); at Petrograd (Deditius, 1885; Bianchi, 1907); at New Ladoga (von Brandt, 1880); about Ladoga and Onega (Sievers, 1877); abundant at Archangel (Dresser, 1871–81; Goebel, 1869a; Seebohm, 1882a; Alston and Harvie-Brown, 1873). E. von Middendorff (1891) has recorded its breeding at Shishgin Light on the White Sea, H. J. Pearson (1899) found it breeding in the Kanin Peninsula, Bianchi (1902b) has reported it for the Murman coast (May 18), Harvie-Brown (1876) found it common north of 64° 30′ between the 40th and 65th meridians of east longitude. This may be a convenient place to mention its occurrence in Spitzbergen, where it was found on Horn Sound in late March, 1901, by Bauendahl (*fide* Schalow, Journ. f. Ornith., vol. 50, p. 126, 1902). Bunge (*fide* Schalow, 1905) recorded a "teal" from the same place one year previous, May 16, 1900, possibly indicating a regular but limited migration to southern Spitzbergen for breeding purposes. To return to Russia, Harvie-Brown (1877) says that between the 59th and 65th parallels of north latitude the species is common in summer from 30° east longitude to the eastern boundary of Perm, being somewhat rarer between 40° and 50° east longitude, that is in eastern Olonetz and western Vologda. Mejakoff (1856) has recorded it from Vologda Government and Goebel (1873) from Novgorod, as has also Bianchi (1910). In the Urals it is common at Pavda, but becomes rarer in the southern districts of Perm (Harvie-Brown, 1878). It is a very common breeder in west-central Russia, in Moscow (Menzbier, 1883; Lorenz, 1892) and in Tula (Menzbier, 1883), as well as in Orel (Daniloff, 1864) and Ekaterinoslav (Valkh, 1911). Von Nordmann (1840) states that it is "resident" on the Black Sea, and Radde (1854) speaks of the species as common in summer in the Crimea. According to Moeschler (1853) it is a very common

Russia **Spitzbergen**

breeder on the lower Volga, at Sarepta, and Seebohm (1882) says the same for the steppes of Astracan.

In Asia the Common Teal seems to breed throughout the Caucasus, of course only in proper localities (Radde, 1884). Robson (*fide* Dresser, 1871–81) also states that it breeds in the interior of Asia Minor, but such statements are too vague to be of much value. I have no doubt that the species nests in the northern sections, and G. C. Taylor's statement (1872) that it was common at Ismid in late May has already been quoted. Radde (1884), moreover, says the species breeds sparingly on the lakes of High Armenia and in the Karabagh Mountains. The fact that Tristram (1884) met with the Teal in Palestine during June lends probability to his statement that it may breed there, but the exact status of the species throughout Asia Minor and Persia is still so undetermined that I feel it is better to be conservative in including records which seem very unusual, though of course not improbable. Zarudny (1911) says it may breed in the Zagross district of Persia, and C. Swinhoe (1882) thinks it may breed in southern Afghanistan. In Transcaspia it undoubtedly breeds, and has been recorded as nesting at Merv (Radde and Walter, 1889) and on the lower Tedshen (Zarudny, ?886, 1889–90). According to Severtzoff (Dresser, 1876) it breeds in Turkestan, excepting the southwest sections, and Schalow (1908) and Hume and Marshall (1879) both state that it breeds in western Turkestan. North of the Caspian it breeds all over the Kirgis (Nazarow, 1887) specifically in the Middle Kirgis (Suschkin, 1914). It is very difficult to give definite statements as to the breeding of the species in the district of the northwest Himalayas. Personally I am inclined to believe that this Teal does not ordinarily breed south of the mountains of northern Afghanistan nor east, in this particular district, of the western Tien-shan and Issyk-kul. The evidence at hand is Schalow's (1908) statement that it probably nests in western Pamir and the Altai, the testimony of Laubmann (1913) that it breeds on the Naryn and on the Tekes, Severtzoff's (1883, p. 76) remark that it probably breeds in Pamir, and Smallbones's (1906) statement that it apparently breeds on the Ili River and on the Issyk-kul. Schalow (1908) states emphatically that the species does not breed in Yarkand, although it has been once or twice met with on the upper Tarim. Adams's (*fide* Hume and Marshall, 1879) statement that the species is quite common throughout the year in Kashmir must be accepted with reserve. To recapitulate, the southern breeding limit of the species in this very confused region is most probably formed by the mountains of northern Afghanistan, the southern boundary of Pamir, the eastern boundary of Pamir, the western boundary of the Tarim desert, the western boundary of the Dsungari desert, the Altai and thence east along the northern boundary of the Mongolian deserts. As to whether the species breeds in the eastern Tien-shan I find no evidence which might lead to a decision one way or another. North of Turkestan the species seems to breed abundantly throughout western Siberia, becoming more common in the north. North of Lakes Balkasch and Saissan-nor, Finsch (1879) found it abundant on the steppe lakes between Semipalatinsk and Omsk, on the Arkat Hills and on the Marka-kul, as well as on the Ala-kul. From what he says the Teal seems to be common all along the Ob River even to its mouth, for it was found at Obdorsk in the middle of July, on the tundra lakes in late July, and on the Shchucha River (a tributary of the Ob joining it on the left below Obdorsk) in early August. Ushakov (1913) says it is as common a breeder as the Mallard, if not more common, in the Tobolsk Government. Apparently it breeds even farther north, for Zitkov (1912) found it on the Yamal Peninsula. Passing eastward to the mouth of the Jenesei it is common north to about 70° (Seebohm, 1879); according to Popham (1897, 1898) and Palmén (1887) 70° 30′ is the northern limit in this region. Information concerning the middle Jenesei is very scarce, but Pawlowski (*fide* Taczanowski, 1893) found it apparently breeding on the Wiljui River and from the upper Jenesei it has been recorded breeding at Minussinsk and in the Russian Altai (Suschkin, 1913), while Radde (1863) met with the species in the eastern Sajan Mountains in May. It breeds south of Lake Baikal to the northern boundary of the Mongolian deserts; at the source of the Amur (Radde, 1863), in Dauria (Taczanowski, 1874), on the mountains of the middle Amur (Bolau, 1881;

Asia

Asia Minor

Persia

Radde, 1863) and on the lower Amur (von Schrenck, 1859). In eastern Asia the breeding range seems to run southward again so as to include the entire country between the Japanese Sea and the eastern boundary of the Mongolian Desert, formed by the Chingani Mountains. Within this area it breeds sparingly at Lake Hanka (Prjevalski, 1878), abundantly in Manchuria (Baker, 1908), not in Korea, but south at least to Peking (Baker, 1908). Blackwelder (1907) says he has no doubt it nests in the Tsinling Mountains, south of the Ordos, and the fact that Prjevalski (1878) met with this Teal in late May in the Kuku-nor region (36° north latitude, 100° east longitude) would almost suggest that it breeds in the Nan-shan Mountains. I see no reason why this should not be the case, nor why the species might not breed even in northern Tibet, although Schalow (1908) is inclined to believe that this is not so. Its occurrence as a breeder in this region must still be regarded as hypothetical. In northern Siberia the species seems to reach an extreme limit, if we are to credit Palmén's (1887) statement that its range extends to 73° 30′ at the mouth of the Lena. Maak (1859) found it breeding at the junction of the Wiljui and Lena and on the Morkoka. Bunge (1883) met with it at Shigalowo at the mouth of the Lena, May 6. Palmén (1887) says it occurs on the Jana, but for some reason gives 68° as its limit in that district. Personally I believe it probably occurs everywhere even to the Arctic coast east of the Lena, but for lack of evidence I hesitate so to indicate it on the map. As in northern Europe, the species would be uncommon at best on the coast of the Arctic Sea. Thayer and Bangs (1914), however, state that it was found commonly at Nijni Kolymsk, at the mouth of the Kolyma, after June 5. Farther south it was found to be common as a breeder about Gichiga (J. A. Allen, 1905), at Amginsk and on the south shore of the Ochotsk Sea (A. von Middendorff, 1853); its breeding on Saghalin seems to me fairly well substantiated when we take into consideration the fact that Nikolski (*fide* Taczanowski, 1893) found it common there in August, while Lönnberg (1908) reports it as being met with in May and October, and Borissow (*fide* Hesse, 1915) thinks he found its eggs in May on the island. Baker (1908) speaks of a few breeding in northern Japan, but this can be taken to mean northern Yezo, and I am not certain that it breeds there. It does not nest on the Kuriles (Blakiston and Pryer, 1878) nor in Kamchatka (Taczanowski, 1893; Bianchi, 1909; Stejneger, 1885). It breeds commonly on the Commander Islands, both Bering and Miedin or Copper Isle (Stejneger, 1885; Clark, 1910a; Dybowski, *fide* Taczanowski, 1893). In extreme northeastern Asia it has been recorded from the Anadyr, May 22 (Bianchi, 1908) and W. S. Brooks (1915) actually records a specimen taken at Indian Point, Chukoshkii Cape, on June 6. But this becomes less remarkable when we consider that the species has been recorded from many of the islands in the Aleutian chain, which leads us to suppose that it undoubtedly breeds as far east as the mainland of Alaska. For the Aleutians I find records of its occurrence on Attu, Kiska, Amchitka, Atka, Unalaska and Semidi Isles (U.S. Biological Survey; Bent, 1912). It has also been recorded from the Pribilof Islands, and may have bred there in 1914 (Hanna, 1920). Von Brandt (1891) quotes a record of its occurrence as far south as Sitka. According to Cooper (*fide* Grinnell, Bryant and Storer, 1918) it is found not rarely in California! Belding (quoted by Grinnell) thinks it bred near Stockton, California. Both the statements seem to me very unlikely, and certainly require further proof.

Eastern Asia

Saghalin

Japan

Commander Islands

California

A remarkable breeding record is that recently published by Gadow and Gardiner (1903) according to whom it is resident and breeds (!) on several islands in the Maldive archipelago. Young birds were actually found there. The species is frequently met with in India even in summer, but it has never been recorded from there as a breeder, while from the Maldives it had been unknown before the record above mentioned was published. There seems to be some reason to suppose the species may breed in the Nile Delta (Shelley, 1872), and Ogilvie-Grant (1902) records it from Fashoda in May!

Maldives

Winter Range

Ordinarily the Common Teal does not winter much north of 45° and never south of the Equator, but like many other species it is found much farther north in western Europe than the parallel above indicated. A few actually winter in Iceland (Hantzsch, 1905) though I find no evidence of their doing so on the Faroes or the Shetlands. It is well known throughout the United Kingdom in winter (Dresser, 1871–81; Seebohm, 1885; R. Gray, 1871; W. Thompson, 1851; Ussher and Warren, 1900; etc.), and in the south of England is rare at any other season.

Shetlands

Norway

On the Continent the species winters as far north as southern Norway, according to Collett (1871), and is found there on the coasts from Orkedalen to the Swedish border. Mortensen (1909) says it winters in Denmark, and in Belgium it is common in the cold season (Dubois, 1912). Dresser (1871–81) states that it is abundant in winter in France, and Paris (1907) calls it a resident, but I believe it is found only sparingly in the interior being most common on the Atlantic and Mediterranean coasts. Backhouse (1887) says it is the commonest duck in winter about Perpignan, and Lilford (1875) obtained it in the market of Cannes, Provence, in late December. According to A. C. Smith (1868), Tait (1896) and de Seabra (1910), it is abundant in winter in Portugal, and the same is true of Spain. From this latter country it has been reported as occurring in large flocks at Santander, on the coast of the Bay of Biscay (Irby, 1883), occurring also at Lac de Lourdes in the Pyrenees (H. Saunders, 1884). According to Arévalo y Baca (1887) it is very abundant in Valencia, Andalucia and Murcia as well as in central Spain. Reyes y Prosper (1886) has recorded it for the Balearics, Mallorca and Minorca. It is common in winter in Corsica (Jourdain, 1912; J. Whitehead, 1885; Wharton, 1876) and in Sardinia (Salvadori, 1865; Giglioli, 1889–91) while in Italy the species is met with in winter from Savoy (Bailey, *fide* Dresser, 1871–81) southward through Lombardy, Venice, Liguria, Tuscany, the Marches, Apulia, Calabria and Sicily (Giglioli, 1889–91). C. A. Wright (1864) met with it in November and March in Malta, and Despott (1917) says it is especially common there in winter. Fatio (1904) says the Teal winters in various parts of Switzerland, and according to Naumann (1896–1905) it has been known to winter in about all the western and southern States of Germany, as well as in Silesia. In what was formerly the Dual Monarchy it seems that a few winter occasionally in Bohemia and upper Austria (Naumann, 1896–1905), in Hungary (Madarász, 1884) and in the Tyrol (Althammer, 1857), being more common in the last place and becoming even more so in Dalmatia (Kolombatovič, 1903), Montenegro (Naumann, 1896–1905) and Albania (Lodge, 1909). So also the birds appear to winter abundantly throughout the Balkans, in Bulgaria (Reiser, 1894) and all along the lower Danube and in Bessarabia (Radakoff, 1881) as well as in Macedonia (Elwes and Buckley, 1870), in the Ionian Isles (Lilford, 1875) and in Greece (Powys, 1860; von der Mühle, 1844). According to an old statement of von Nordmann (1840), it winters on the Russian coast of the Black Sea also, and this does not seem at all improbable. The species winters abundantly in Asia Minor (Robson, *fide* Dresser, 1871–81), being found specifically about the Bosphorus (Braun, 1908), at Smyrna (Strickland, 1836), at Sardis (Flora Russell, 1912), in the mountains of Cilicia and in the Taurus (Danford, 1878, 1880), on Cyprus (Lilford, 1889; Bucknill, 1911) and in Mesopotamia, at Ras el Ain (Neumann, 1915), and along the lower Euphrates (Meinertzhagen, 1914). Evidently it is exceedingly common even far inland. Tristram (1884) and Meinertzhagen (1920) met with the species in Palestine and Hart (1891) and Wyatt (*fide* Hart, 1891) both found it on the Sinai Peninsula. In Arabia it has been found at Aden by both Yerbury (1886) and Barnes (1893), and I have little doubt that it occurs sparingly along the entire Red Sea coast of Arabia. The British Museum possesses specimens from Socotra. In Persia and neighboring districts it winters in

Portugal

Spain

Corsica

Italy

Malta

Germany

Austria

Hungary

Balkans

Russia

Asia Minor

Cyprus

Arabia

Persia

the Caucasus (Radde, 1884) and on the southwestern Caspian (Radde, 1884). According to Zarudny, (1911) it winters on the south Caspian, and Stolzmann (1893) found it in winter at Askhabad, Transcaspia. It appears to winter more rarely in northern than in southern Persia, as in southern Chorassan and the Parapamis (Zarudny, 1911), Badghis (Sharpe, 1891), northern Afghanistan (Scully, 1876) and Samarkand (Carruthers, 1910), and more abundantly in Mesopotamia and southwestern Persia (Witherby, 1903), Baltistan (Richmond, 1896), southern Afghanistan (C. Swinhoe, 1882), Baluchistan (Meinertzhagen, 1920), Seistan, Kuhistan and Kirman, and northern and southern Baluchistan (Zarudny, 1911; Baker, 1919). Farther east the species winters on the Indian border at Kohat and Kurram (C. H. T. Whitehead, 1909) and sparingly also at Gilgit, Kashmir (Scully, 1881). In the region of the northwestern Himalayas it winters eastward as far as Kashgaria (Schalow, 1908; Scully, 1876) and Yarkand (Scully, 1876). In India it appears to be abundant everywhere from Sind and the Punjab east to Bengal and Assam, and from the Himalayas south to Ceylon and the Maldive Archipelago (Hume and Marshall, 1879; Baker, 1908; Legge, 1880; Gadow and Gardiner, 1903). It is found in Upper Burma and in northern Siam (Hume and Marshall, 1879) in the South Shan States (Rippon, 1901), in Arakan (Blyth, 1867; Hopwood, 1912) and rarely in Tenasserim and Pegu (E. W. Oates, 1883). Kloss (1903) has recorded it for the Andamans and Nicobars, and the British Museum possesses a specimen from the Straits. Considering that the Teal has been found several times in North Celebes (Meyer and Wiglesworth, 1898) and also in the Philippines (R. C. McGregor, 1909; J. Whitehead, 1899), I think it not improbable that it may winter in suitable places throughout the Malay Peninsula and on some of the western islands of the East Indies. In Yunnan, H. R. Davies (1909) found it one of the commonest ducks and in western Yunnan it is described as abundant by Menegaux and Didier (1913).

India

In China proper, the Teal is a common bird in winter, and has been variously reported from that country by R. Swinhoe (1860, 1863a, 1875) (Hainan, Formosa, Hong-kong, Amoy, Foochow, Chefoo, Peking); by La Touche (1892) (Swatow, Foochow, Chin-kiang); by Styan (1891) (lower Yangtse); by R. Slater (1882) (Hankow); by Seebohm (1884) (Kiu-kiang); by Kleinschmidt (1913) (Kiauchow); by H. A. Walton (1903) (Peking); by David and Oustalet (1877) (Peking); by Thayer and Bangs (1912) (Hupeh and Szechwan); by E. H. Wilson (1913) and La Touche (1922) (Kiating); by Berezowski and Bianchi (1891) (Kan-su); by Sowerby (1912) (Shensi and Kan-su); and by Prjevalski (1878) (Tsaidam, Mongolia and Kuku-nor). Kalinowski (*fide* Taczanowski, 1893) says it winters in Korea; and in Japan it is abundant throughout according to Ogawa (1908) (Tanegashima and Ishigakishima, Loo-choo group), Blakiston and Pryer (1878) (southern Japan), M'Vean (1878) (Tokio), Whitely (1867) (Yezo). Von Ditmar (1900) states that it winters in Kamchatka, but I find no evidence to substantiate this rather striking statement. As remarked above, the species has been found in northern Celebes in winter, and some stay there all summer (Meyer and Wiglesworth, 1897) while in the Philippines it is not uncommon in Luzon (J. Whitehead, 1899) and has been taken also on Calayan (R. C. McGregor, 1909) and Mindoro (?) (Platen, *fide* R. C. McGregor, 1909).

China

Japan

In Africa the species winters abundantly in Egypt and Nubia (Shelley, 1872; A. L. Adams, 1864) and according to von Heuglin (1873) it is found on the Red Sea, the Somali coast, and on the Nile in Kordofan and at the Sobat Delta. Peel (1900) also records it from Berbera Harbor, Somaliland, while Balfour (British Museum) and Bennett (*ibid.*) met with it on Socotra Island. As many as fourteen have been seen there at one time (P. L. Sclater and Hartlaub, 1881). Jägerskiöld (1904) reports it common on the White Nile from Omdurman to Dueim and Hartmann (*fide* Naumann, 1896–1905) found it on the Blue Nile as late as May! Von Heuglin (1873) some time ago reported it from Lake Tana, Abyssinia, and since then it has been reported as common in southern Abyssinia (Ogilvie-Grant, 1900), and also from Lake Cialalaka (Antinori and Ragazzi, *fide* Salvadori, 1884, 1888). In northwestern Africa it is apparently common in Tunis (Whitaker, 1905; Talamon, 1904; Millet-Horsin, 1912) and in Algeria (Loche, 1867; Rothschild

Africa

and Hartert, 1912; Buvry, 1857; J. H. Gurney, 1871; Menegaux, 1919) while in the Sahara it has been found in the north (Tristram, 1860) and even south to El Golea and Ouargla (Hartert, 1913). It is recorded "on passage" at this latter place, and this almost suggests that some of the birds may cross the desert to Sokoto, northern Nigeria, where the species has been found in flocks numbering hundreds in November, January and February (Hartert, 1886). Rochebrune (1883–85) recorded it as common in Senegambia and recently the statement of this usually unreliable writer was reaffirmed by Hopkinson (1918) who says the Teal breeds (!) in Gambia and appears to be a regular migrant there. In Tangiers and Morocco the species is also abundant in winter (Favier, *fide* Dresser, 1871–81; Carstensen, 1852; Reid, 1885; Drake, 1867). Off the West African coast, Cabrera y Diaz (1893–94) and Bolle (1857) have reported it as common in the Canaries, and Bannerman (1919) says it is found in all the islands of the group in winter. Salvadori (1901) has recorded a specimen taken as far south as Boa Vista, Cape Verde archipelago, February 8, 1898.

Canaries

Passage Area

As in the case of other species there is an area in both Europe and Asia in which the bird is known chiefly on passage. In Europe this area of passage is not so clearly defined for this species but it seems to include northern France and Belgium (Longchamps, *fide* Dresser, 1871–81; Dubois, 1912; Paris, 1907), Switzerland (Fatio, 1904), Lorraine (d'Hamonville, 1895), northern Italy (Giglioli, 1889–91), Slavonia (von Schweppenburg, 1915), Hungary (Madarász, 1884; von Buda, 1906), the countries of the lower Danube (Radakoff, 1879) and southwestern Russia (Goebel, 1871). In Asia the passage area is much like that for other species, and is conditioned chiefly by the presence of enormous deserts in the central part. The species seems to occur chiefly on passage in northern Persia and northern Afghanistan, for example, in north and south Chorassan, Parapamis and Kuhistan-Kirman (Zarudny, 1911), in Transcaspia at Merv and on the Murghab and Tedschen (Radde and Walter, 1889; Zarudny, 1886, 1889–90), at Samarkand (Carruthers, 1910), at Kohat and Kurram (C. H. T. Whitehead, 1909), at Gilgit, Kashmir (Biddulph, 1881; Scully, 1881), in Chamba (C. H. T. Marshall, 1884), all over Turkestan (Dresser, 1876), in Kashgaria (Koslow, 1899), Yarkand (Henderson and Hume, 1873) and on the upper Tarim (Schalow, 1908) as well as in southern Tibet (H. J. Walton, 1906), northern Tibet (Koslow, 1899; Schalow, 1908) and the eastern Altai (Hesse, 1913). Prjevalski's discoveries (Deditius, 1886) in central Asia are of utmost importance. He found the species on migration in great numbers on Lob-nor, on the Kuku-nor and on the Urangu River (47° north latitude, 88° east longitude). It occurs chiefly on passage in northern China, at Peking (David and Oustalet, 1877), in Manchuria (Bianchi, 1902) and in Korea (C. W. Campbell, 1892), while farther north the same is true of Transbaikalia (Taczanowski, 1874), Lake Hanka (Prjevalski, 1876) and the Suiffun and Ussuri Rivers (Dörries, 1888).

Sporadic Records

Concerning the occurrence of this Teal in Greenland I am unable to say much. It was not certainly known to occur there until Winge published his paper in 1899. There are evidently three records of its occurrence on the east coast (Helms, 1910), all from the vicinity of Angmagsalik, it seems. There are also two specimens in the Schiöler collection (Schiöler, 1912). Specimens taken on the west coast are very probably all American Green-winged Teal (*Anas carolinensis*). It is a casual visitor to Spitzbergen and Bear Island (Jourdain, 1922) but probably, as mentioned above, does not breed there. The European Teal has occurred in Labrador, on Hamilton Inlet, July 23, 1860 (Coues, 1861), and there appears to be a second specimen without locality (C. W. Townsend and Allen, 1907). It is very rare in Nova Scotia (Downs, 1888), there being only two specimens recorded (Piers, 1915), and on the Atlantic coast of the United States there are authentic records for the following States:

Greenland

Labrador

United States

Maine, two (Brock, 1907; Norton, 1911); Massachusetts, three (Forbush, 1912); Connecticut, one (Treat, 1891); New York, several (Eaton, 1910); New Jersey, one (W. Stone, 1909); Maryland, one (Kirkwood, 1895); Virginia, one (Rives, 1890), besides a few other scattered records. The references to its occurrence in California seem to require substantiation (Grinnell, Bryant and Storer, 1918).

Migration

Thanks to the efforts of Mortensen (1909) and also of Thienemann (1915), we have a few results derived from experiments with marked birds of this species. The former marked one hundred and two of these birds at Fäno, Denmark, in October, 1907, and from twenty-two which were reported within the next year or so, it appeared that some flew to Ireland, some to southwestern England, two to Holland, one to southern Spain, and one to northern Italy. The significant fact is that most of the birds evidently pass along the Atlantic coast in going south. One of Thienemann's specimens went from Schleswig-Holstein, southwest also, to the mouth of the Ome in Normandy. His second record is far more interesting, for the bird, after being marked near Petrograd, Russia, in late June, 1912, was taken in late October, 1913, on the Danube in southern Hungary; that is, it flew south-southwest, apparently following river courses. Thomson (1921) mentions a Teal banded as a duckling in Inverness-shire, England, May 29, 1912, that was recaptured in County Waterford, Ireland, February 5, 1914. The results with marked birds are still too meager to be of much real value, but they are at least suggestive. Others banded in England show an interchange with Sweden, Norway and Ireland while some marked as adults in Holland have been shot in England and northern France (Witherby, 1922; Thomson, 1921, 1923; van Oort, 1912, 1913).

To sum up, we can now say tentatively that British-bred Teal are far less local than British-bred Mallards. Particularly interesting is a case which shows that a Teal reared in England does not necessarily return to the same region to breed, for one reared in Cumberland was recovered two years later in southern Norway. There are other cases (four Mallards, a Tufted Duck and two Sheld Ducks) which were hatched in Great Britain and were later found either nesting or summering as adults in Scandinavia, northern Germany or northern Finland! This has resulted in suggesting a new term, "abmigration," to cover cases where the individual does not apparently migrate south in the autumn but makes a northern journey to new nesting grounds in the following spring (Thomson, 1923). It is, however, difficult to find out where such individuals have really spent the winter and whether they have actually "skipped" a southern migration.

Concerning the dates of migration of the Common Teal I do not believe much need be said. The birds usually start north in early March, or possibly late February, reaching central Europe in late March or early April and northern Europe in May or even June (Lapland). From data at hand it seems that as the migration period progresses the birds linger more and more so that it takes them perhaps twice as long to complete the second as it does the first half of their journey north. This fact has led many observers to suppose the species breeds in sections where it winters, simply because the birds were seen as late as May on some occasions. These remarks apply to Asia as well as to Europe, and much the same is true as regards dates. Prjevalski's very valuable data (Deditius, 1886) of migration on the Lob-nor in central Asia show that these Teal arrive on their way north as early as late February, and that they pass on in March. According to this observer they always come from the southwest, never from due south; and he adds that they always pass from northeast to southwest in autumn. This means that they probably do not cross the cold deserts of high Tibet in any considerable numbers, but that those which winter in Persia, Afghanistan, etc., very likely pass northeast through Kashmir and follow the Altin-tagh and Nan-shan Mountains to eastern China and Manchuria, while those which winter in eastern and southern India, Burma, etc., very probably come north *via* Yunnan and western China. As regards dates I know of nothing remarkable or noteworthy. As in Europe, so in southern Persia, Afghanistan and India some birds linger until May or

even June, and none arrives in extreme northern or northeastern Asia much before early June. Concerning the autumn migration both in Europe and in Asia, I will only say that it is slightly later than that of some other common fresh-water ducks. The birds apparently do not leave central Europe until the second half of October, excepting in small numbers, and arrive in southern Europe in late October, November or even December. Similar conditions exist in Asia, only there the seasons are more sharply defined.

GENERAL HABITS

HAUNTS. The Common Teal is in every respect a true shoal-water duck; indeed, it must be regarded as very closely related to the Mallard and very far removed from the other so-called "Teal" with which it is placed by systematists. Structurally it is certainly a member of the genus *Anas* and in general habits, voice, display, nesting and feeding activities, it is very Mallard-like.

The nature of the country it inhabits is essentially the same as that chosen by the Mallard, but it prefers shallower feeding grounds and boggy places and is satisfied with even smaller pools of water. It is also more strictly confined to fresh water, but in winter it will resort to the sea when the inland feeding grounds freeze up, or when it is persistently persecuted. During migration many resort to salt-marshes, just as our Teal do. Teal are perhaps more apt to gather in large numbers on mud than Mallards, and like to rest through the day on banks and mud-flats.

In the breeding season they show more tendency to seek higher elevations than the Mallard does. Instances have been recorded of their doing this in Saxony (Heyder, 1913), Iceland (Hantzsch, 1905), Caucasus (Radde, 1884), Yarkand, 15,000 to 16,000 feet (G. Henderson and Hume, 1873), western Tibet, 15,200 feet (H. J. Walton, 1906; Parrot, 1909). In the winter, under the tropical conditions of the Philippines, it has been found at elevations of 5000 feet (J. Whitehead, 1899).

WARINESS. In most groups of birds the smaller species are tamer and more confiding than the larger ones. The Teal is a good example of this, and even in western Europe, where other species are extremely shy, it is still comparatively easy to approach and is generally regarded as the least wary of the ducks. During the rare times when they assemble in great numbers on the coastal estuaries of the British Isles they are much more easily approached by punt-gunners than are the Mallard or the Widgeon. But they are said by at least one writer (Cordeaux, 1896) to be much wilder in the night than in the daytime, which may be due to their nocturnal habits. In walking up ducks at night he found the Teal taking alarm even before the Mallards.

These birds are little annoyed by civilization and are much more likely to be found near settlements or highways than other ducks are. Their natural disposition is well shown by their behavior in parts of India, where they were at one time practically immune, and could be found on village ponds, sometimes not even rising

after a shot had been fired among them (Hume and Marshall, 1879). Another trait that is rather characteristic is their habit of returning to the place where some of their number have been killed or of coming back and circling overhead when they have been driven up from a favorite haunt.

Daily Movements. Teal are probably even less active during the day than Mallard. Even where not disturbed they are more or less nocturnal, or at least crepuscular in their habits. Not only are they inactive by day but they are also extremely silent, and as Millais (1902) notes, they will "sit for hours motionless, apparently lost in a brown study or with the head buried in the scapulars." All ducks, or at least all the common northern surface-feeders become more nocturnal as winter approaches.

Gait, Swimming, Diving. On land it prefers to run about on mud-flats or places covered with an inch or two of water or hunt food close along a bank or ditch. It holds its body horizontally, as does the Mallard, but it cannot run or walk with anything approaching the speed of the latter. On the water it has the appearance of floating lightly and somewhat higher than the larger ducks, but its progress on the water is slow compared to the larger species. Even when wounded it is loath to dive, and prefers to escape by hiding among reeds and other vegetation. Only the young are expert in diving in the presence of danger.

On the water adult males can be distinguished from the American Green-wing by the absence of the white bar on the side of the breast and the presence of the white outer scapulars which are very prominent at long ranges. These ornamental scapulars are not assumed until full maturity. Females of the two species are indistinguishable in the field and cannot certainly be told apart in the hand (see under American Green-wing).

Flight. The flight of Teal is very characteristic and interesting to watch. They are far more erratic than larger ducks and when traveling short distances seldom hold long to one course. The flock continually darts this way and that, first turning the upper side, then flashing the light-colored under parts so that they appear like a company of plovers. A flock of Teal at a distance may easily be taken for a flight of wading-birds. Then, too, they almost always fly much lower than Mallard, and like to hug the surface of the water.

They rise abruptly from either land or water and once in the air the wings cause a slight swishing, but not a loud whistling noise. Almost all sportsmen are deceived by the apparent speed of their flight, and older observers estimated this at from 90 to as high as 140 miles per hour. Even the lowest of these estimates is probably far higher than that ever attained by any duck. Flocks of Teal often include individuals of

the Mallard, Pintail or Shoveller and these never seem to have any difficulty in holding the pace. A single Teal timed by Meinertzhagen (1921) over a fixed course in southern Palestine, made only 44 miles per hour, which is less than the average for other ducks timed. Shovellers and even Spot-bills have been noted as leading Teal in flight (Finn, 1915). Teal fly in thick packs on short flights, and string out into long single or double lines when on migration. Flocks ordinarily number from thirty to forty individuals, but flocks of a hundred are not uncommon, and much greater companies are sometimes formed by the temporary union of a number of flocks.

Association with other Species. Teal, particularly when in small parties, have no objection to associating closely with the larger surface-feeding ducks. Single individuals of Mallard, Pintail, etc., are very often seen flying with a flock of Teal. The evidence of their mixing with the Garganey is somewhat conflicting. Judging from the relation of the American Green-wing and Blue-wing I should not be surprised if they mix almost indiscriminately on the autumn migration and on the winter grounds. Among the larger ducks their preference is probably for the Mallard, due no doubt to similarity in feeding habits.

A Teal's nest with two Mallard's eggs has been reported (Krüper, 1857), but I have not found any evidence of Teal depositing their eggs in the nests of other species. In England a nest containing both Teal and Pheasant eggs was once found (C. E. Pearson, 1908).

Voice. Teal are at most times of the year very silent but in the spring, during display, a soft single or double whistle sounding like *preep* or *preep-preep* is often heard. This is perhaps analogous to the whistled display-note of the Mallard. During autumn and winter the males are much more silent, and if the note of the European Teal is the same as that of our American Green-wing (which I assume to be the case), there is a grating, squeaking, snipelike call, rather different from the spring whistle. It has been likened to the creaking of an old Irish car wanting grease (W. Thompson, 1851). These notes sound quite differently at various distances and they have given rise to much confusion as to the calls of the two sexes. The female has an entirely duck-like, but weak and high-sounding *quack* which is also used as an alarm note. The quacking note is at times run together into a *quegquegqueg*, characteristic of many ducks. Both sexes will make a hissing note like that of most ducks when approached closely. A very peculiar sound is described by Saxby (1874) who heard a female Teal before being driven from her nest utter a note resembling the low continued croaking of a frog; she kept this up for perhaps half a minute before flying away.

The trachea, as figured by Eyton (1838) and Yarrell (1884–85) is merely a minia-

ture reproduction of that of the Mallard. The dilatation is left-sided and about the size of a large pea.

Food. The diet of Teal consists more of the seeds of pond-weeds and sedges than of their leaves or stalks. They are chiefly vegetarian, but at times take a considerable amount of animal food: snails, worms, slugs and insect larvæ. Of the seeds of various aquatic plants which have been found by Naumann (1896–1905), W. Thompson (1851), Cordeaux (1896), Kelso (1913), the following may be mentioned: *Panicum glaucum* and *viride* (meadow-grasses); *Potamogeton marinus* and *pectinatus* (pond-weeds); *Glyceria fluitans* (manna-grass); *Carex muricata* (sedge); *Polygonum sapathifolium, persicaria* and *hydropiper* (smart-weeds); *Scirpus lacustris, palustris* and *maritimus* (rushes); *Zostera marina* (eel-grass). When food is plentiful in autumn and winter they rarely visit the grain-fields, but in spring they are found more commonly than any duck except the Mallard, feeding on old grain in the stubble fields (Dresser, 1871–81; Naumann, 1896–1905). In India they feed to some extent on the wild rice (Hume and Marshall, 1879).

Courtship and Nesting. The display of the Teal is a most beautiful performance, very suggestive of that of the Mallard, but not quite so elaborate. It was first described by Millais (1902), then by Rogeron (1903), Heinroth (1911) and Wormald (1914). Several males are commonly seen in action at the same moment. The tail is erected, the neck arched, and the body raised almost perpendicularly in the water, all at the same instant. Then the bill is dipped to the surface of the water and passed rapidly up the breast. This whole exhibition, which takes so long to describe, is in reality made with such surprising speed that it is by no means easy to obtain a clear impression of it. The low, clear, double whistle of the male is uttered the moment the bill is passed down the chest. Wormald's "position number 5" (in which the Mallard stretches the head out flat on the water) is not seen in the Teal except after the mating act. Pursuit flights, after the breeding grounds are reached, undoubtedly take place as in our American Teal. This was first suggested by Naumann many years ago but apparently has never been fully described for this species.

The time of nesting is of course very irregular, depending on latitude, altitude and the conditions of the particular season, so that a series of dates can mean very little. Teal nest somewhat later than Mallard, but rather earlier than Gadwall or Widgeon. In the British Isles, May is the usual month, but a few nest as early as late April or as late as early June. In Iceland the breeding period usually falls in late May and early June (Hantzsch, 1905), and in northern Europe it extends into middle or late June. In northwestern Finland clutches are complete about mid-June (Montell, 1917), and there are late dates for July. On the middle Ob, young in down

were taken on July 7 (Finsch, 1879), and on the Jenesei the last nest was taken July 15 (Seebohm, 1879), while on the Wiljui young were taken as early as June 22 (Maak, 1859). On the Commander Islands the nesting season is, as we should expect, earlier, beginning early in June (Bianchi, 1909). Bent (1912) took fresh eggs in the Aleutians on June 7.

The nest is by no means always on the banks of ponds, streams or marshes, but may be just as often found a good distance back on high ground among heather or in wooded situations. It is well constructed, uniform in size, measuring about 24 cm. outside and 13 cm. inside diameter (Hantzsch, 1905). The nest-down is darker than that of the Garganey and is more characteristic than in many other ducks. It has no white tips (but sometimes light-brown tips are indicated) and may be described as blackish sepia or light brown, with large conspicuous white bases (H. Noble, 1908; A. C. Jackson, 1918; Wormald, *in litt.*).

The full clutch varies in number from seven to fifteen, but eight to eleven are the usual numbers found, nine perhaps being the average. The eggs are slightly smaller than those of the Garganey, and in color are light yellow, sometimes brownish, and as a rule with a characteristic greenish tinge. The average measurements of one hundred eggs were 44.65 by 32.68 mm., the maximum length and breadth being respectively 49.5 and 35.2, the minimum 41 and 31.2 mm. (Hartert, 1920).

The incubation period is about twenty-one days but has been variously given as from nineteen to twenty-four. Observations made by Hantzsch (1905) in Iceland showed that the female sat twenty days from the time the last egg was laid, but spasmodic sitting of an hour or two had taken place before this. This would make the true period about twenty-one days, for ducks usually begin to sit from one to two days before the last egg is deposited. Mr. Wormald's records of eggs hatched under artificial conditions suggest an even shorter time, namely, nineteen to twenty days.

The behavior of the male during and after the incubation period has not been adequately studied, but it seems to differ somewhat from that of the Mallard. The mated pairs appear much attached and polygamous tendencies are perhaps less common than with other migrant ducks. Millais (1902) remarks that after the end of April one never sees among Teal the *tertium quid* arrangement so common with other ducks. Most males desert the females and begin to flock together toward the end of the incubation period, but there are so many cases of males being seen close to the nest or even in company with the female and young that one must conclude that the male is at times quite domestic in his habits. Millais (1902) mentions an instance of a male accompanying the brood, and in Iceland Hantzsch (1905) says he has seen the same thing. Older writers (Faber, Dresser, etc.) have also referred to this trait so that it cannot be considered merely as an exceptional occurrence. The instinct of protection is very strongly developed in the female, and more or less

pathetic and emotional accounts of her devotion to the young fill the pages of ornithological literature.

STATUS. There cannot be any doubt of the general decrease of Teal in western Europe, following the decline in the number of Mallard, Widgeon, etc., after about 1760. The old English decoy records place it as second in abundance, being exceeded only by the Mallard, though in certain places it was exceeded by the Widgeon. In the Ashby Decoy (Lincoln), of the 96,000 ducks taken between 1833 and 1868 there were 44,568 Teal as against 48,664 Mallard. In the Steeple Decoy (Essex), in the early eighteenth century, the Teal were next to Mallard but were outnumbered 30 to 1 by the Widgeon. In the Hale Decoy (Lancaster), the Teal were second to the Mallard in the years 1812 to 1825, but since 1875 the Teal have greatly increased and have far outnumbered the Mallard; from 1875 to 1885, Teal numbered 4327 as against 1361 Mallard, and from 1900 to 1917 the proportion changed still more (6545 Teal to 820 Mallard). In the Orielton Decoy, from 1877 to 1885 the Teal were second in abundance to the Widgeon and far outnumbered the Mallard; and from 1905 to 1918 the situation continued the same, 3749 being taken in those years. In the Iken Decoy (Suffolk), Teal predominated in the years 1878 to 1885, numbering 5902 in a total of 12,683 ducks. On the island of Föhr (North Sea) in the year 1877 there were 33,000 Teal taken in a total of 35,490 ducks; on Sylt, 2374 Teal in a total of 4194; but on Amrum, where the Pintail was in a majority, Teal numbered only 250 in a total of 11,800. Figures for 1880 show no change in the situation on these islands. The large proportion of Teal taken in these decoys is due to the tameness of the birds, and they would certainly have become greatly reduced had it not been for the consistent conservation of game on the larger estates. From 1830 to 1850, W. Thompson (1851) noted a tremendous decrease in Belfast Bay, due perhaps to the local increase of commerce.

For the rest of the range the information is very meager. In southeastern Hungary it was noted to have decreased markedly on migration in the years previous to 1906 (von Buda, 1906). Shelley (1872) considered it the most abundant water-fowl in Egypt and Nubia; and in India it is probably the commonest winter visitor (Hume and Marshall, 1879; C. H. T. Whitehead, 1909). In Kamchatka it is second only to the Pintail in abundance (Stejneger, 1885).

ENEMIES. Teal are more frequently hunted by predatory birds than are the larger ducks. Smaller hawks of the peregrine type attack them. Eggs and young are exposed to the usual enemies of water-fowl: crows, magpies, ravens, stoats, weasels, foxes, pike, etc. Millais (1902) has something interesting to say about individual Brown-headed Gulls which had taken a special liking to young Teal in down. Careful investigation of this destruction at Murthly Moss, Scotland, showed

that the offense was not general, but was traceable to certain definite individuals. When the guilty birds were killed the Teal population remained immune. In northern China and also near Hong-kong the Peregrine Falcon is said to feed almost exclusively on Teal (Vaughan and Jones, 1913).

The insect parasites found in the feathers as well as the intestinal parasites are listed by Naumann (1896–1905).

Damage. No damage to agriculture has been noted.

Food Value. In Europe Teal are usually reckoned the best of the shoal-water ducks, though some prefer the Mallard. Like all ducks they are best in the late autumn, but this species never becomes strong or fishy in taste. In India they are so highly esteemed for the table that in the old days some of the epicures used to pen up several hundred Teal in the spring in what Hume and Marshall (1879) call a "tealery." They go on to give exact instructions for the construction of a teal-paddock. The birds were consumed in the hot summer months, when they made a delicious and appetizing meal, and apparently they were more easily kept in condition in these enclosures than other ducks.

John Ray in 1678 wrote: "This bird for the delicate taste of its flesh, and the wholesome nourishment it affords the body, doth deservedly challenge the first place among those of its kind" (Willughby and Ray, 1678).

Hunt. On the coasts of the British Isles, Teal are hunted with punt-guns, large shots being sometimes made. W. Thompson (1851) speaks of fifty taken at one shot and thirty-two at another in the winter of 1837–38. The British record seems to be 106 killed at one shot on the River Shannon in 1879 (Encyclopedia of Sport, 1897–98, Punt Shooting). In France they are easily decoyed to the "huts," and Ternier and Masse (1907) speak of killing thirty during a morning flight. Many more than a hundred have been killed in one day by one gun flight shooting, but the largest number seems to have been reached by Lord Lewisham who at Laughton on October 6, 1913, shot 186 to his own gun (Gladstone, 1922).

Wing-shooting at Teal is more difficult than at any other duck, on account of the disconcerting nature of their flight. But when they come in large bunches a successful shot can sometimes be made by a not over skilful sportsman. A single Teal flying close to the ground or water is one of the most difficult of all shots. As already remarked Teal were the mainstay of the old decoys, but these contrivances have mostly disappeared in recent times. In the fourteenth century Teal could be purchased for two pence each, while at the same time the Mallard sold for five pence. During the seventeenth and eighteenth centuries they were sometimes reckoned as "half-ducks," and three were often taken as the equivalent of one Mallard.

They seem to be one of the easiest species to take in trap- or clap-nets, a primitive method still in use in India, China and even Holland. Hume and Marshall (1879) say that in their day live Teal could be bought from native netters at small stations for from two to eight rupees per hundred! Even in recent times it has appeared in large numbers in some European markets, shipped from China.

Behavior in Captivity. Teal are among the most attractive of ducks for small pools of water. They have the advantage of not injuring or tearing up the grass, but they have the disadvantage of remaining wild and retiring unless one has the luck to get a nice stock of hand-reared birds. When captured wild and pinioned they unfortunately very seldom breed. I have found them poorly adapted to stand the long cold and dry winters of New England. During our winters their feet often become dry, shriveled and completely useless, and the birds seem unable to hold their weight. Our Blue-winged Teal is of course even more delicate. But in the London Gardens, where the climate is more suitable and they can be kept out of doors most of the year, European Teal have always done well. There the average length of life of 43 specimens was over four years, the maximum being about thirteen years (P. C. Mitchell, 1911). Schmidt (1878) says he had specimens live 6, 7, 8 and 41 years. This last record is certainly open to question (perhaps 14 is meant) for I doubt whether the smaller ducks live nearly so long as the large ones. The maximum age attained by specimens in the Cairo Gardens was 5 years 1 month (Flower, 1910).

Teal have probably been kept in European collections ever since the Middle Ages. The Prince of Condé had them at Chantilly in 1663 (Loisel, 1912). The London Gardens have possessed them since their earliest days, and it is quite remarkable that they should have bred there no less than thirteen times between the years 1830 and 1880 (P. L. Sclater, 1880). They have also bred in apparently very unsuitable surroundings in St. Stephen's Green, Dublin (Millais, 1902). This has proved a rather difficult bird to breed on private estates. "Pinioned birds have once or twice but very seldom nested and reared young," so Earl Grey of Falloden writes me. "This species is very shy and most difficult to tame. Wild birds have occasionally become quite tame but have not stayed through the breeding season, except when a wild drake has paired with a pinioned duck." From this it may be seen that the innate degree of wildness or tameness of a species is no criterion of its behavior in captivity. Among English fanciers the species has been bred by Mr. Wormald (*in litt.*) and Sir Douglas Brooke (Millais, 1902) but the only method that has proved at all successful was the one originated by Sir Richard Graham at Netherby. He purchased forty or fifty pairs each season and pulled the stubs of the primaries at a time which enabled them to regain their flight toward the end of the breeding season. These birds then stayed in the vicinity and bred freely. After a number of years, he, in 1908, captured some 1100 Teal in his traps. This did not represent even half the

stock on the estate (Millais, 1913). Needless to say these experiments at Netherby are now a thing of the past.

It might be well to remark here that efforts of this kind are not successful in our northeastern States, because it is almost impossible to develop a local stock of any duck on account of our severe winters and strong tendency of the birds to migrate. A pair of European Teal that was brought over from England in 1909 bred in my artificial pond at Wenham the following year. The two young were never caught, but stayed about the pond till December 6 when they evidently migrated. In the spring of 1911, on April 19, I was astonished to find a female Teal, undoubtedly of this species, on the pond. I say undoubtedly, for Green-winged Teal are very rare here in the spring, and this one acted in every way like an old acquaintance, and stayed with us all through the spring and early summer (Phillips, 1911a).

I understand that Mr. John A. Cox has also bred this Teal at East Brewster, Massachusetts.

Live Teal used to bring from 10 to 15 shillings the pair in England, but in this country the price was nearer $10.00 to $15.00. In the years 1919 to 1920 this species again began to appear in our American bird markets, some even coming from the Orient.

HYBRIDS. Wild-killed hybrids between this and the following species have been recorded by Suchetet (1896): *Anas boschas*, *Anas penelope*, *Anas acuta*, *Anas querquedula*. Poll (1911) mentions a cross between this species and *Spatula clypeata*.

In confinement various hybrids have been produced. Crosses with the Pintail are fertile. I saw a live bird on Mr. Blaauw's ponds in Holland that was three-fourths Teal and one-fourth Pintail and as nearly as I could see it resembled a pure-bred Teal in every detail.

AMERICAN GREEN-WINGED TEAL

ANAS CAROLINENSIS Gmelin

(Plate 31; Plate 32)

Synonymy

Anas carolinensis Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 2, p. 533, 1778.

Anas americana Bonnaterre (*nec* Gmelin), Encyclop. Méthodique, vol. 1, p. 155, 1791.

Anas migratoria Bartram, Travels in Florida, p. 295, 1791.

Anas crecca Wilson (*nec* Linné), American Ornith., vol. 8, p. 101, pl. 60, fig. 1, 1814.

Anas sylvatica Vieillot, Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 167, 1816.

Querquedula carolinensis Stephens, General Zool., vol. 12, pt. 2, p. 148, 1824.

Boschas carolinensis Jardine ed. Wilson's American Ornith., vol. 3, p. 124, 1832.

Boschas crecca americana Denny, Proc. Zool. Soc. London, 1847, p. 40.

Nettion carolinensis Baird, Birds No. America, p. 777, 1858.

Querquedula americana Murray, Edinburgh New Philos. Journ., vol. 9, p. 230, 1859.

Nettion carolinense Blakiston, Ibis, ser. 1, vol. 4, p. 9, 1862.

Querquedula crecca, var. *carolinensis* Dubois, Faune Vertebr. Belg., Oiseaux, vol. 2, p. 453, 1892.

Vernacular Names

English: Green-winged Teal, American Teal, Winter Teal, Green-wing, Mud Teal, Red-headed Teal.

French: Sarcelle à ailes vertes, Cognotte, Sarcelle d'hiver.

German: Grünflügelige Krickente, Amerikanische Krickente, Krantente.

Spanish: Pato floridano, Zarceta de otono, Zarceta de invierno.

Mexican: Metzcanauhtli, Cincuitzcatl.

Eskimo: Ting-a-zo-me-ok.

DESCRIPTION

Adult Male: Similar to the European Green-winged Teal, *Anas crecca*, but the white line along base of culmen and over eye is obsolete, or nearly so. The white line along the edge of the green patch under the eye is also very much reduced, or absent; the vermiculations on the mantle are less bold, and there is no white in the long outer scapulars. On each side of the breast, at the bend of the wing, is a broad white crescent, as in *Anas formosa*.

Iris dark brown. Bill black. Legs and feet olive-gray, darker at the joints; webs brownish black. Wing 180–190 mm.; tarsus 28–31; culmen 35–39.

Weight to 12 ounces (0.37 kilograms) and about an ounce more at times.

Adult Female: Similar in every respect to the female of *Anas crecca*, except in one character, which, although not constant, is worth noting. The anterior buff wing-bar is usually of a richer color in the American Teal in both sexes and at all ages, particularly in the outer half of the bar. In the European Teal this band is almost always very pale buff, or pure white, especially the outer end. I think it probable that at least nine out of every ten specimens can be correctly placed by this character alone.

Weight 10 or 11 ounces (0.28 to 0.31 kilograms).

Young Female in First (Juvenal) Plumage: Very similar to adult, but more spotted on lower abdomen, and with tail-feathers blunted. The spotting is very marked on the lower parts in the young during July and August.

Young Male in First (Juvenal) Plumage: Impossible to tell with certainty from the female until one or two adult, or semi-adult feathers begin to show upon the scapulars, flanks, or breast.

Adult Male in Eclipse: Similar to the female but the mantle and scapular feathers lack the light edges so that the whole upper side has a more uniform appearance. The lower side is almost impossible to tell from that of the female, but there are concealed black spots upon the breast. A few vermiculated feathers are present on the mantle or lower flanks in most specimens.

Young in Down: Like Mallard but darker on back and much smaller. Not to be told from young of *Anas crecca*. Dark orbital stripe, dark aural patch, and superciliary light streak present as in many other true ducks.

Young with first feathers on the lower side and on scapulars and pileum are very similar to the Mallard at the same age, but the lower side is more silvery, and not so heavily streaked.

DISTRIBUTION

The Green-winged Teal is the American representative of the Old World Common Teal (*Anas crecca*) and its range is confined to North America, although it has straggled to Europe and Asia. Its

General usual breeding range does not extend east of the Great Lakes, though it does breed at a few points farther east, and is a rare straggler on the Labrador coast. Packard (1891) took "fully fledged young" at Fort Chimo late in July, and there are several non-breeding records for the Labrador peninsula (C. W. Townsend and Allen, 1907; Hantzsch, 1908). Furthermore, the species has been taken several times in western Greenland, from Nanortalik in the south, to Jacobshavn in the north; and there is also a specimen taken at Nunusek, east Greenland, in May (Schalow, 1905). In Ontario and the eastern or maritime Provinces of Canada the Green-

Eastern Canada wing nests occasionally. It has been seen on Anticosti in summer (Schmitt, 1904), is abundant on the Magdalens (Cory, 1878) where it breeds sparingly (Young, *fide* J. and J. M. Macoun, 1909; Maynard, 1882; Sanford, Bishop and Van Dyke, 1903; Goss, 1891). The Museum of Comparative Zoology possesses a specimen in down taken by C. J. Maynard in Amherst Harbor, Magdalens, on July 19, 1873, and Mr. H. K. Job tells me he saw many adults in these islands in the summer of 1921. The species appears to have nested also in Newfoundland and on Prince Edward Island (U.S. Biological Survey). Chamberlain (1882) describes it as a common summer resident in New Brunswick (!), but this is undoubtedly incorrect. There is one breeding record for Nova Scotia (U.S. Biological Survey), and one for Manicouagan, Quebec (Dionne, 1906).

In the United States the easternmost breeding records seem to be for western New York, where it has nested on the Montezuma marshes (Eaton, 1910) and at Buffalo (Cooke, 1906). Two young

United States birds, shot in late July or early August in Orange County, New York, were thought to have been bred near by (Forester, Amer. Game, 1873, p. 244). In Pennsylvania a few probably nest in the mountains of the north-central districts (B. H. Warren, 1890), but all these are sporadic records. There is no convincing evidence of its nesting in Ohio, though in northern Indiana

MAP 46. Distribution of American Green-winged Teal (*Anas carolinensis*)

Breeding range, dotted line; winter range, broken line

some may breed (A. W. Butler, 1898) as they do in Michigan (Gibbs, 1879; Cooke, 1906) and in southern Ontario (Cooke, 1906). Barrows (1912) is of the opinion that none now breeds in Michigan.

The eastern boundary of the true breeding range is Illinois and Wisconsin. Cooke (1906) gives several records for the former State, and Grundtvig (1894) says it breeds often in Wisconsin. Kumlien and Hollister (1903), however, speak only of its having nested formerly on Lake Kushkonong and commonly in the northern parts of Wisconsin. Audubon found it breeding at Green Bay, Wisconsin, in July, so possibly it was more common there once. It is known as a breeding bird in Minnesota (Hatch, 1892; Roberts, 1919) although a rare one, but there is no reliable record of its nesting in Iowa. A few nest in the sand-hill region of Nebraska (Oberholser, 1920; U.S. Biological Survey notes) and in various localities in South Dakota (Agersborg, 1885; Visher, 1913). Even in North Dakota it is a rare breeder (Job, 1899; Bent, 1901–02). Farther west the species becomes more common, breeding throughout Montana (A. A. Saunders, 1921), as well as in Wyoming (Cary, 1917; W. C. Knight, 1902; Grave and Walker, 1913) and in Colorado (W. L. Sclater, 1912). It has nested even in New Mexico, in San Miguel County (W. I. Mitchell, 1898), and probably at Lake Burford (Wetmore, 1920). There seems to be a breeding record for Big Lake, east-central Arizona (U.S. Biological Survey). In Utah it nests on Great Salt Lake (Cooke, 1906; Wetmore, 1921); and in Nevada at Washoe Lake (Cooke, 1906), on Spring Mountain (Hoffman, 1881) and on Quinn River (W. P. Taylor, 1912). Grinnell, Bryant and Storer (1918) state that only a few breed locally in California, the records extending to the southernmost parts of Ventura County. The species nests also in Oregon (Bendire, 1877; Merrill, 1888; Pope, 1895–96), in Idaho (Merriam, 1891) and in Washington (W. L. Dawson and Bowles, 1909), but nowhere in the United States can the Green-wing be classed as a common breeding bird.

In British America the species breeds rarely east of Manitoba, though Spreadborough, on what evidence I do not know (*fide* J. and J. M. Macoun, 1909), found it common and breeding on both sides of James Bay, and it has been recorded from the Severn River and York Factory (Preble, 1902). In Manitoba it is a common breeder (E. E. Thompson, 1891; Taverner, 1919), as well as in Keewatin, where Preble (1902) met with considerable numbers about Cape and Fort Churchill, and even farther north along the coast of Hudson Bay. The British Museum possesses a specimen taken by Rae on Repulse Bay! But in general the species is not common on the Barren Grounds and many of these northern records are only summer stragglers. The center of the breeding area is in west-central Canada, from Manitoba to Lake Athabasca (Cooke, 1906; J. and J. M. Macoun, 1909; F. Harper, MS.). Raine (1892) has recorded it for southern Saskatchewan, and Buchanan (1920) found it very common on the Churchill River. Throughout central and northern Alberta it is a very common nesting bird (Soper, 1918; Stansell, 1909; Preble, 1908), as it is in British Columbia (Kermode, 1904) and on Vancouver (R. Brown, 1868). In the Canadian Northwest it breeds less rarely north of 60° north latitude. It is apparently quite common as far as Great Slave Lake (Preble, 1908), but farther north the species does not occur regularly east of the MacKenzie basin (Seton, 1911) and even along the course of that river it is a rather rare bird (MacFarlane, 1908). Nevertheless it has been found breeding at Fort Anderson and north to the region between Fort Good Hope and the old fort of that name (Preble, 1908). Stefánsson (1913) says it is rare in the MacKenzie delta though several, he claims, were taken farther east on the coast beyond Richard Island. Schalow (1905) is inclined to believe that this species occurs on all the Arctic islands between Bering Strait and West Greenland, but the single specimen taken by Rae (British Museum) on Repulse Bay seems to me rather inadequate evidence to support such an opinion.

Central Canada

Western Canada

West of the MacKenzie the Green-wing has been found on the Arctic coast at Demarcation Point and Herschel Island (W. S. Brooks, 1915) and southward on the Porcupine River (Lockhart, *fide* Baird, Brewer and Ridgway, 1884), the upper Yukon (Kennicott, *ibid.*; Nelson, 1887) and the Macmillan River (Osgood, 1909). On the Pacific coast it is known to breed in southeastern Alaska (Hartlaub, 1883), at Sitka (Willett, 1914) and thence northwest in Prince Wil-

Alaska

liam Sound (J. Grinnell, 1910). It appears to be rare on the lakes and rivers of the interior, but Dice (1920) found it rather common on the Kuskoquim, and it has been recorded from Ugasik and Nushagak, the mouth of the Kuskoquim and St. Michael's (L. M. Turner, 1886). F. S. Hersey (1916) also recorded it from the latter place, while Nelson (1887) met with it farther up the river at Nulato and northward on the coast to Kotzebue Sound, Hotham Inlet and even Point Barrow. Further records for Kotzebue Sound are those of C. H. Townsend (1887) and J. Grinnell (1900). Bent (1912) has more recently shown that the statements of L. M. Turner (1886) and Nelson (1887) that the Green-wing breeds throughout the Aleutian chain, even west to Attu, are probably wrong. Careful examination showed nothing but European Green-wings (*Anas crecca*) on these islands. The western limit of the American species is probably Unalaska, whence it has been recorded by Clark (1910) and Dall (1874) as well as by L. M. Turner (1886) and Nelson (1887). Specimens have also been taken on the Pribilovs, on St. George (Palmer, 1899) and St. Paul. A pair of this or of the European species bred on the latter island in 1914 (G. D. Hanna, 1916).

Winter Range

Although the Green-winged Teal winters chiefly south of the 40th parallel of north latitude, its cold-weather range extends much farther north on the Pacific coast, perhaps even to the eastern parts of the Alaskan peninsula. Teal, probably the European species, are said to be common in winter on Unalaska (Dall, 1874; L. M. Turner, 1886; Nelson, 1887). Nelson (1887) even speaks of it as resident west to the island of Kyska, but probably refers to the Common Teal of Europe and Asia. It is true, however, that on one occasion at least, the species has been taken in Asia, at Haneda, between Tokio and Yokohama, Japan, on February 16, 1916 (Kuroda, 1920). At Sitka and in southeastern Alaska it winters regularly in small numbers (Willett, 1914; Bailey, MS.), while on the coasts of British Columbia it is common in the cold season (Kermode, 1904). It is more or less common on the coasts of Washington (W. L. Dawson and Bowles, 1909; and others) and is said to be a common resident in Oregon (Pope, 1895–96) while it is abundant in California (Grinnell, Bryant and Storer, 1918). Even in the interior States it is known to have wintered as far north as western Montana (A. A. Saunders, 1921) and the Yellowstone National Park, Wyoming (U.S. Biological Survey). Farther south it winters in Nevada (A.O.U. Check-list, 1910) and in Utah (Cooke, 1906), as well as in parts of Colorado (W. L. Sclater, 1912) and more abundantly in southern Arizona (Swarth, 1914) and New Mexico. Eastward the species winters as far north as Nebraska (Bruner, Wolcott and Swenk, 1905) and southern Iowa (Cooke, 1906), and in the States to the south it is recorded for Kansas (Bunker, 1913; H. Harris, 1919), Missouri (Widmann, 1907), Oklahoma (Cooke, 1914), Arkansas (Howell, 1911), Texas (Strecker, 1912) and Louisiana, where, of course, it is very numerous (Beyer, Allison and Kopman, 1907; and others). East of the Mississippi it has wintered as far north as central Illinois (Ridgway, 1895; Cooke, 1906) and Indiana (A. W. Butler, 1898), apparently also in Ohio (W. L. Dawson, 1903), Pennsylvania (B. H. Warren, 1890) and New York (Eaton, 1910). In Massachusetts, Rhode Island and Connecticut it is only a rare winter visitor (G. M. Allen, 1909), while farther north, in Nova Scotia it has wintered a few times (Tufts, 1918). Southward along the Atlantic coast it winters occasionally in New Jersey (W. Stone, 1909), in Delaware (Rhoads and Pennock, 1905) and in Maryland (Kirkwood, 1895). Apparently it is not able to winter in the Alleghanies, though it is described as common in Fulton County, Kentucky (Pindar, 1889) and at Reelfoot Lake, western Tennessee (Forest and Stream, vol. 6, p. 147, 1876). It is a common winter bird on the coast north to Virginia (Rives, 1890), being found everywhere in eastern North Carolina (T. G. Pearson, Brimley and Brimley, 1919), South Carolina (Wayne, 1910), Georgia and Florida (Scott, 1892; Cory, 1896; etc.), but in nothing like the numbers found on the Gulf Coast, and farther west. It apparently extends south only to Lake Okeechobee, Florida (U.S. Biological Survey). In Alabama a few winter on the

Alaska

Japan

Western United States

Central United States

Eastern United States

river of the same name (Golsan and Holt, 1914), while western Mississippi with Louisiana forms its chief winter resort.

West Indies

In the West Indies the Green-wing winters in great numbers in the Bahamas (Cory, 1890; Riley, 1905), but in Cuba and Jamaica it is rare (Gundlach, 1875; P. L. Sclater, 1910), while from Haiti and Porto Rico it has never been recorded. On the other hand it seems to be common in the Lesser Antilles, on the islands of St. Vincent, Grenada and in the Grenadines (Clark, 1905) as well as in Carriacou (Wells, 1902).

Mexico

The species winters throughout most of Mexico whence it has been recorded for Sonora (Ferrari-Perez, 1886), Lower California (Belding, 1883), Chihuahua (Sanchez, 1877–78), Sinaloa (Lawrence, 1874), Zacatecas (Richardson, British Museum), Tamaulipas (Phillips, 1911), Vera Cruz (P. L. Sclater, 1857a, 1859a, 1860a), Guanajuato and Jalisco (Sanchez, 1877–78; Beebe, 1905), Michoacan (*fide* Cooke, 1906), Mexico (Sanchez, 1877 78; Villada, 1891 92), Tlaxcala (Ferrari-Perez, 1886) and Tabasco (Rovirosa, 1887). It has been taken also in British Honduras in the Orange Walk district (Goss, 1891), and in Honduras (Dyson, *fide* P. L. Sclater and Salvin, 1876; Moore, 1859). J. J. Rodriguez (1909–10) includes it as a doubtful species in his list of Guatemalan birds.

Extra-Limital Records

A few records outside the regular range remain to be mentioned. In the Bermudas the species is said to occur occasionally in autumn (J. M. Jones, 1859; von Martens, 1859; Reid, 1884). It has also been taken three times in England, *viz.*, in Hampshire, 1840; in York, 1851; and in Devon, 1879 (Brit. Ornith. Union Check-list, 1915). There are no further European records. In the Pacific the Green-wing occasionally visits the Hawaiian group (R. C. L. Perkins, 1903) and possibly Laysan (Bryan, 1915). I have already mentioned the one record for Japan (Kuroda, 1920). In the remarkable appearance of American ducks in the Marshall Islands, the Green-winged Teal was also represented by considerable numbers (Reichenow, 1899a, 1901; Schnee, 1901).

Passage Area

The greater part of the United States is for this species merely a passage area. States that may be included in this area are California (Grinnell, Bryant and Storer, 1918), and especially the interior States such as Montana, Idaho, Wyoming, Nevada, Utah, Colorado (W. L. Sclater, 1912), Kansas (Goss, 1886; Bunker, 1913), Nebraska (Bruner, Wolcott and Swenk, 1905), the Dakotas, Minnesota (Hatch, 1892; Roberts, 1919), Iowa (R. M. Anderson, 1907), Missouri (Widmann, 1907), Arkansas (Howell, 1911) and all the States east of the Mississippi, excepting the coastal States from Virginia to Florida, where the species is a winter bird, rather than a bird of passage. In Canada the area of passage includes everything east of Manitoba. In the Maritime Provinces it is scarcely more than a straggler, at least this is so in Quebec and Nova Scotia, although small flights do at times occur (Dionne, 1906; Wintle, 1896; McIlwraith, 1894; C. W. G. Eifrig, 1910). In Ontario on the other hand it passes through the Lake region in great numbers.

Migration

Dates of first arrivals on migration mean very little for this species. In 1916 at Long Point, Lake Erie, they were present in thousands as early as October 2, with perhaps double that number of Blue-winged Teal. Yet the bulk of the migration is late. In New England the Green-wing, rare as it is, appears almost always in November, between the 1st and the 10th, and records at Wenham Lake show it as late as December. In 1919 early in November there were a few; and again in 1920 there was a small scattered flight. In 1922 it appeared in mid-October.

Many dates will be found in Cooke (1906) and in more recent publications. The birds appear in western Pennsylvania sometimes as early as early September, in Virginia in late September, but they do not become common until later, in early November. Farther north they occasionally linger until rather late, as November 4 (Prince Edward Island), November 1 (Montreal), November 9 (Saskatchewan), early October (St. Michael's, Alaska). West of the Mississippi these Teal begin to arrive from middle to late September, and in California by September 17, but the bulk of the migration takes place in the last half of October and the first half of November. The average date of final disappearance in thirteen years for Ontario is October 28. The average for Iowa in seven years is November 22. They appear as far south as the Valle de Mexico as early as October, and some arrive in the Lesser Antilles in October.

The spring migration in the Mississippi Valley is early, for they arrive in Missouri in late February, in Illinois in early March, and in Iowa about the same time; in Minnesota in late March and in North Dakota in early April. They reach Manitoba in middle April, and Saskatchewan about April 13. On the Pacific coast the birds reach high latitude early in the spring. They have been recorded for the middle Yukon May 3 and for the mouth of the Yukon May 20. They sometimes linger late into the spring in the Carolinas and Louisiana before commencing their overland flight, and I have seen them in South Carolina in thousands in late March. Probably the birds which are going to the far north tarry longer on their wintering grounds.

Spring records for the Northeast are not very plentiful, and may represent merely the small numbers which nest in the Magdalen Islands and other points near there. There are, however, spring records for all our New England States and for Montreal (Wintle, 1896). It is very suggestive that at the west end of Lake Erie spring records show fewer Teal, which certainly points to a different spring route, probably farther west.

There is one set of interesting records of these Teal banded at Bear River Marshes, Utah, by A. Wetmore (U.S. Biological Survey) in the late summer and autumn of 1915 and 1916. Wetmore was able to place 336 bands in connection with his work on the duck sickness. There were 51 returns, distributed as follows: Utah, Bear River and vicinity, 30; California, 19; Arizona, southern, 1; Colorado, southern, 1. The California returns are from practically all over the State except the extreme northern and southeastern parts. There are four from Los Baños, in the San Joaquin Valley, two from Brito, California, and two from Merced County, California. These ducks were all shot the same year they were banded or the year after. The mortality by the hand of man was therefore about 15%, and these mortality statistics may some day be of great interest.

A Green-wing banded at Avery Isle, Louisiana, February 12, 1917, was killed at Badger, Minnesota, April 25, 1920. Another banded in the same place was taken near Herman, Minnesota.

GENERAL HABITS

HAUNTS. The American Green-winged Teal is so closely related to the Common Teal of the Old World that it has been relegated to a subspecific rank by Hartert (1920). The ranges of the two birds undoubtedly overlap on the Alaskan peninsula, but since no specimen showing intermediate characters has been taken, it seems more reasonable to allow the bird the position of a full species.

So familiar is this Teal to sportsmen and ornithologists that any long account of its life-history is superfluous. In its habits it does not differ in any way from the Common Teal, save where the nature of the country and the climate affect its food or migration. Just as the Mallard in Europe shows a strong tendency to become sedentary, while in America it becomes so only in a few widely scattered districts, so

the Green-wing is far less a resident species than is the Common Teal in certain parts of Europe. It is essentially a fresh-water species, but on both the Pacific and the Atlantic coasts it has been known to raft on the salt water in order to escape danger, and occasionally it even feeds on tidal or brackish flats (W. L. Dawson and Bowles, 1909). During migration it often resorts to salt-marshes.

Wariness. Though wilder than the Blue-winged Teal, this species is tamer than any of the other northern shoal-water ducks. In thick cover it is just as likely to attempt concealment as to fly up. These habits were well described by L. M. Turner (1886) who observed them near St. Michael's, Alaska, where they would even dive under a mass of vegetation in preference to flushing. Single individuals or small lots as they appear in New England ponds, always come to live decoys without the least suspicion and I have even seen them refuse to fly more than a few yards after a shot had been fired. This habit of returning to a favorite feeding ground even after a raking shot, is particularly characteristic of the species and has been noted by many writers. When spring shooting was allowed it was common to see one of a pair return after its mate had been killed.

Daily Movements. This Teal is extremely inactive during the daytime and through the noonday hours loves to sleep on mud-banks, in shallow water or even on logs. Elliot (1898) says he has seen large flocks floating down the Mississippi with the current, quite indifferent as to where it would take them. At night they become very active, as any one can testify who has heard the constant whistling of the males and chattering of the females on moonlight nights.

Gait, Swimming, Diving. The male cannot be distinguished from the European Teal when on the water, unless the white breast-bar can be seen. The prominent white scapulars of the European bird are diagnostic when present, but they are among the last of the feathers to reach full maturity. In posture and movements on the water and on land, our Teal differs in no way from its Old World relative.

I have seen this species as well as the Blue-wing on the Gulf Coast perching quite commonly on low dead trees or branches projecting from the water; and Mr. Francis Harper, who has been collecting recently on the Athabasca, writes me that he found them very often sitting on logs by the side of streams in summer.

Flight. The small size and erratic flight of this Teal have given rise to most astonishing estimates as to its speed, one writer (Hatch, 1892) even giving it credit for a rate of 160 miles per hour! It is more likely as has been said in connection with the preceding species, that the speed is rarely more than fifty miles per hour.

Outside the regular migration route, the Green-wing is often seen here in New

England traveling either as single birds, immature young of the year, or in small groups of from four to six. The family parties do not seem to be particularly large, judging from the numerous reports of five or six birds being seen. On the regular wintering grounds or great gathering points they of course assemble in larger numbers, the flocks often reaching fifty or more. I have seen dense clouds numbering thousands gathered at the mouth of the Santee River, South Carolina, in March and in the great brackish Gulf Coast marshes, thousands, mixed with Blue-wings and Shovellers, may sometimes be driven from one small pond, arising like a dark cloud with a thunderous roar of wings. I do not recall ever having seen a high, migrating flock, but they are said to assume formations similar to those of the Mallard when on migration.

Association with other Species. Teal seem to prefer Mallard and Black Duck to other larger ducks, but they mix almost indiscriminately with the Blue-wings during the autumn and winter, although during the winter the Blue-wings mostly withdraw from the northern part of the Green-wing's range. Stragglers on migration sometimes pick strange company for I have watched them passing far out at sea with flocks of Scoters and I have heard of them doing the same thing with Eiders.

Voice. The voice is probably exactly the same as that of the Common Teal. The scraping, creaking, snipe-like call heard in the early autumn may come from immature males. I am not certain about this, but I am sure that the clear double whistling note is a rare sound except in the spring. I remember once very early in the morning mistaking the call of an immature male for that of a snipe. Dr. A. F. Warren, who made very careful notes on captive Teal, writes me that the drake's voice is not the same in the autumn as in the spring, but is hoarser and not so clear-cut. He also describes a sound like the "low, soft whine of a little puppy" from the drake in the breeding season. This last sound is only to be heard for a distance of a few feet. Single females swimming toward live decoys are usually very noisy, even in early autumn, but the males are throughout most of the year comparatively silent ducks. In addition to the sharp high *quack* of the female and the *preep-preep* of the male, Harper writes me that on the breeding grounds he once surprised a pair asleep on a log that were too dazed to do more than utter a call sounding like *kup-kup-kup*. Another note entirely strange to him came from some very tame birds which swam toward him out of apparent curiosity. This he described as like *ek-ek-ek*. I have never heard any such note as this.

Food. Audubon's early investigations of the diet of this Teal seem to be borne out by the recent examinations made by the U.S. Department of Agriculture. That

much-quoted author describes them as feeding principally upon the seeds of grasses, either floating or on the stalks, besides small acorns, fallen grapes or berries, aquatic insects, worms and snails. Briefly summarized, the results of an analysis of 653 stomachs by the U.S. Biological Survey showed that birds taken in autumn, winter and early spring fed on vegetable matter in a proportion of over 90%. By far the largest item of food came from various species of sedges, including the seeds of a large number of unidentified bulrushes (38.2%). Various pond-weeds totalled 11.52%, while grasses, smart-weeds and algæ comprised most of the remainder. No fewer than 30,000 seeds of a *Cyperus* (sedge) were found in one stomach, while other stomachs contained as many as 1000 of some other kind of seed. The animal food consisted chiefly of insects, of which flies were the commonest family; small mollusks were next in number, and their broken shells were often used as grinding material instead of gravel (Mabbott, 1920). No acorns or grapes were found in any of these stomachs. It is interesting to find that in the interior of Alaska the food consisted of essentially the same items, *viz.*, sedges and horse-tail rush, *Equisetum* (Dice, 1920).

Courtship and Nesting. The display as I have frequently seen it on my own ponds and as Harper observed it for me many times in the Athabasca region, is exactly like that of the European Teal (see Plate 32). Pursuit flights are as common in this species as in other shoal-water ducks and were first noted by Harper on June 13. Two males and a female, and once three males and a female, took part. Sometimes the excited birds would twist in and out through the tops of the willows, the female uttering her call.

Most of the nesting dates are for June, but there are several Alaskan dates for late May (Dall and Bannister, 1869; Nelson, 1887) and one for Edmonton, Alberta, May 25 (Spreadborough, in J. and J. M. Macoun, 1909). The spring of 1919 was a late one, and at the mouth of the Athabasca the first young were seen on July 2, and during the following week several other broods were found. On July 14 three nearly feathered young were seen (Harper, *in litt.*). It may be interesting to note that this species was one of the few ducks found in any numbers in the small rocky ponds toward the east end of Athabasca Lake, where the Surf Scoter was found nesting.

The nest is usually placed near the water, but in a dry spot. Some, however, have been noted as much as a quarter of a mile from the water (Spreadborough, in J. and J. M. Macoun, 1909). It is very apparent from the small number of nests found, even in the great breeding areas, that the nests are better concealed and harder to find than those of the Mallard, Widgeon and Gadwall. Not infrequently they are placed in bushy situations, or under cover.

The normal clutch is probably the same as that of the European Teal, though as many as sixteen to eighteen eggs, undoubtedly the work of two females, have been noted (Dall and Bannister, 1869). The eggs look exactly like those of *Anas crecca*

and are also indistinguishable from those of the Blue-winged Teal, although the maximum measurements for eggs of the latter are slightly larger. The nest-down is the same as that of the European Teal and is many shades darker than the female's winter down (Bowles, 1917). The incubation period is about twenty-one days, or from twenty to twenty-three days (Job, 1915; and others).

After the young are hatched the female is unusually fearless in her attempts to lead the intruder away from the brood. Many stories of the ruses employed are to be found in the literature. Mr. Francis Harper writes me that a female he surprised with a brood turned and flapped all about his canoe, quacking *aahk aahk*, taking short flights, and in alighting, tobogganing along the surface on the outspread webs of her feet, which held her up for some time. The young have the same fine peeping notes as other young Mallard-like ducks.

Careful observations made on the breeding grounds by Bent (1901–02), Job (1902), Wetmore (1920, 1921) and Harper (MS.) failed to show any tendency in the male to stay with the family any longer than does the Mallard. In spite of what has been said under *Anas crecca*, it seems to me that instances of the male remaining with the family must be very exceptional, if they occur at all. Males in eclipse are not so difficult to find as with some other species. On July 6, 1921, near Okanagan Lake, British Columbia, Major Allan Brooks saw nine males in all stages of plumage from full breeding to full eclipse and every one of these birds was capable of rapid flight. The moulting of the primaries takes place some time after the eclipse plumage is complete, as it usually does in other ducks.

Status. Over the whole of New England the Green-wing may be termed an uncommon, late-autumn migrant, and a very rare spring migrant. It is impossible to judge from earlier writers the exact standing of this species seventy-five or one hundred years ago. Aubudon evidently considered it rare to the northeast of Philadelphia, though others considered it tolerably abundant on migration. It probably was never more than 10% or 15% as abundant as the Blue-wing. Forbush (1912), basing his conclusions on correspondence with old hunters and residents, thinks that remarkable flights occurred in Massachusetts up to 1850. I am inclined to think it was never common east of the Hudson, except for sporadic autumn flights which were probably few and far between but may have left a vivid impression on the minds of shooters. My own records at Wenham Lake, Massachusetts, extending over a period of twenty-two years, give a good idea of this Teal's actual standing in the autumn flight. It represents only a little over 1% of all the ducks shot there.

In the Lake Erie region Green-wings are abundant in the autumn, representing 7.5% of the total bag between 1887 and 1920 at the Long Point Club, where 4502 were taken in those years. There is no evidence of any decrease during this period. Very high years were 1887, 1889, 1890, 1901, 1910, 1912, 1916, and 1919.

GADWALL IN DISPLAY

AMERICAN GREEN-WINGED TEAL IN DISPLAY

In 1894 only twenty-six were secured out of a total of 6741 ducks, and in other years (1904, 1905, 1914), almost as lean times occurred. I am told that Teal are absent there in the spring but definite records are lacking. Very interesting statistics from the Monroe Marsh Club (west end of Lake Erie) in the autumn shooting between 1885 and 1901 show that Teal numbered 3587 in a total of 40,615 ducks shot, or 8%, but during the spring seasons not a single Teal was recorded, due apparently to restrictive game laws. The largest years were 1888, 1889, 1890, 1896, 1897, 1898, the largest being 1898. The lowest years were 1886, 1892, 1895, 1900, 1901. A comparison with the number of Blue-wings is not advisable because great bodies of the latter pass over this region before the shooting season is well under way. I am not able to say definitely whether there is a great dearth of Teal in the spring flight. It is possible that their absence in certain places may be partly due to high water. Nevertheless I am inclined to think that there is a more western spring migration route.

Turning to North Carolina we find Teal representing a smaller proportion of the ducks shot at Currituck, numbering only 4% at the Currituck Club, 7% at the Swan Island Club and 2% at the Princess Anne Club (Virginia). Sportsmen do not always shoot Teal when larger ducks are about so that the actual numbers are not entirely representative. However, between the years 1889 and 1918 there is no definite indication of diminution; the large years at the Currituck Club were 1900, 1901, 1904, and small years go back as far as 1889. Large years at the Swan Island Club (1909 to 1919) were 1910 and 1913, the low ones 1918 and 1919 but these last have no significance on account of the new bag-limit law. From my own experience at Currituck I feel sure that Green-wings do not come to that region in as great a volume as they do about Lake Erie. Very likely much of this Erie flight passes south to the west of the Appalachians, down the Ohio and Mississippi valleys just as banded Mallard in that same region have been shown to do.

The status of the Teal is a little different on the South Carolina coast where as many as 324 have been taken in a total of about 3000 other ducks, the proportion varying from 1% to 10% of the shoal-water ducks shot at the Santee Club. This is more of a Teal country than the sounds farther north.

The great winter home of the species is on the Gulf Coast. Here it is extremely abundant, particularly in Louisiana, where I have seen them by the 100,000 in the month of January. Farther west the Green-wing is probably second in abundance among the ducks. In the Rio Grande Valley it was second to the Mallard, representing 16 to 18% of all ducks shot (Leopold, 1919). In California it seems to exceed all other species. In 1895–96 more than 82,000 were sold in the markets of San Francisco and Los Angeles. Records of a gun-club near Monterey show that it is second in number, sometimes exceeded by the Pintail, sometimes by the Widgeon. Of the ducks received by the San Francisco Market in 1910–11 no less than 27% were Teal,

these outnumbering any other species; and in the total number of ducks received by the Hunters' Game Transfer Company in the years 1906 to 1911, Teal numbered 33%. The small numbers of Cinnamon Teal included in these figures would not materially affect the results. There seems to be no doubt about a general decrease of Teal in California, at least up to the years 1914–15 (Grinnell, Bryant and Storer, 1918). But reports from the whole western region indicate a satisfactory increase in this and other species, due to the protection afforded by the Federal Law of 1913.

Teal probably never represented any large proportion of the ducks nesting in Michigan, Wisconsin, Minnesota or the Dakotas, for the great breeding area of the species lies between Lakes Manitoba and Athabasca. On the Bear River Marshes, Utah, although so far south, it was eighth in order of abundance among the breeding ducks, about fifty pairs nesting (Wetmore, 1921). Job (1902) found it a rare breeder in the great duck region of North Dakota, and Bent (1901–02) seems to have found no nest at all. In Minnesota it is still a not uncommon breeder, but may have nested in considerable numbers in years past (Roberts, 1919). According to the figures of the State Conservation Commission it ranged from the third to the twelfth commonest duck shot in the years 1919 and 1920 and represented from 2% to 12% of the total, showing that as a migrant its relative proportion in this region is far less than farther west. In the Athabasca region, which should be near the center of abundance, it was found only fifth in order among the ducks, the Lesser Scaup, Mallard, Goldeneye and Pintail exceeding it (Harper, MS.).

Enemies. From the small number in the family parties as they appear in autumn, I suspect that mortality among young Green-wings may be greater than with Mallard, Black Duck and many diving ducks. Most dangerous of the mammals are coyotes, coons, weasels and domestic cats (H. C. Bryant, 1914; Wetmore, 1921). Among the birds, magpies perhaps do most pillaging of eggs. This is certainly the case in our western States. In the north, crows and ravens may be a greater menace. Gulls of various species are probably destructive only in certain regions and in individual cases. Certain hawks and occasionally herons are said to take young. Being so small, the downy young are probably more often snapped up by fish and turtles than are the young of larger species. Dr. A. F. Warren writes me that these Teal are apparently not susceptible to tape-worms when placed among captive Red-heads and Black Ducks that were highly infected.

Damage. Damage done to crops of growing rice in California or Arkansas is negligible as compared to that inflicted by Pintail, Mallard and some of the geese. The bulk of these Teal arrive so late in the central and southern States that they can have but little effect on agriculture.

Food Value. Teal are usually fat, almost always well flavored and never tough. Audubon thought them superior even to the Canvas-back when shot in the rice-fields of Georgia and the Carolinas. They certainly deserve to rank among the finest of the shoal-water ducks, the only disadvantage being their small size. A Teal's weight is only one-quarter that of a prime Mallard and in the Boston markets where its price, as elsewhere, was relatively high, it used to bring from 60 to 90 cents the pair, while the Mallard and Black Duck brought from $1.50 to $1.75 per pair. In the California markets in Belding's time its value as a table duck is well shown by the fact that it brought from $1.50 to $1.75 the dozen (higher even than the Widgeon) while the Mallard brought from $2.50 to $3.00 the dozen (Grinnell, Bryant and Storer, 1918).

I imagine that at times it feeds on maggots gleaned from dead fish on the salmon rivers of British Columbia, a habit rather common to Mallards in that region, and if this be the case the flesh is no doubt badly tainted.

Hunt. Methods of hunting the Green-wing differ very little from those employed with the Mallard and other surface-feeders. The ease with which they are approached and their habit of returning, make them an easy pot-shot mark for a not too skilful shooter, but of course when shot fairly over decoys, unless one takes a chance at shooting into the thick of a flock, they afford an exceedingly difficult mark.

Behavior in Captivity. Instances of the breeding and laying of pinioned Green-wings in captivity are very rare and there is no doubt that our Teal is just as difficult to propagate as the Common Teal. My own experience is that they are far less apt to breed than the Blue-wing, but unquestionably the proposition would be much simplified if one could establish a local breeding stock in a region of mild, even climate like that of California. I have kept a few pairs from time to time but have never seen one even build a nest or get beyond the preliminaries of courtship, although the European Teal reared a brood for me in 1911. John A. Cox of East Brewster, Massachusetts, and Henry Cook of Woodbury, Long Island, New York, are said to have had some success (Job, 1915). I think the late Wilton Lockwood of Boston bred some on his pond at South Orleans, Massachusetts. Dr. A. F. Warren of Chicopee Falls, Massachusetts, had them nest in his back yard in a city lot, under very unfavorable conditions but did not succeed in rearing any young. His experiences are so interesting that I shall quote them at length farther on. This is indeed a very meager showing when one considers the great numbers that must have been kept in parks and private collections during the past twenty-five years.

I have no accurate data which would give an idea of their longevity. The small ducks are all more apt to fall prey to stray cats, rats, hawks and owls than the larger

species, hence their chance of attaining to a green old age, especially when pinioned, is very small. They "go bad" in the feet in our long, cold New England winters and so are placed on the pond in spring in poor condition for mating.

Dealers dislike to handle Teal as the mortality is always considerable and the birds do not ship very well. They can often be obtained for $6.00 to $12.00 a pair, perhaps less for fresh-trapped specimens. I doubt if our Teal has ever been introduced into European collections. It is too similar to its European cousin to make the effort worth while.

Dr. Warren, mentioned above, has written me about his pets and his success in getting them to nest in such close quarters is so remarkable that I am tempted to quote him rather fully. His yard was about 48 feet square and contained a cement pool eleven by seven feet from which the water was allowed to run out of the tank into a small ditch where the Teal were fed. One female nested four out of the six years that he had her but no eggs went beyond eighteen or twenty days' incubation. One season this female sat for thirty-five days on a set of eggs which later proved to contain nearly adult, but dead ducklings. His Teal laid about June 15 but he had nests as late as August 1, when larger ducks had interfered with their domestic plans. The paired drakes did not moult until their females had begun to sit. Females that did not lay, moulted as early as the males, a fact once or twice noted in other ducks under natural conditions. During moult he noted that his Teal were extremely silent, both males and females.

As to hardihood, Dr. Warren's Teal stood a temperature of 18° to 20° below zero, Fahrenheit, but they could not walk about on land much at that temperature without freezing their feet. The food he used was of great variety. It consisted of mixed grains, smart-weed and yellow-dock seed, besides lettuce and celery-tops. His birds were also very fond of fresh-dug angleworms, particularly during the breeding season at which time they preferred all sorts of animal food. They would not eat the large "night-crawler" angleworms nor live "pollywogs."

Dr. Warren found the male Teal making a rather imperfect nest during the breeding season, but he says that this nest was never used by the female. The final nest was not visited at all by the male and in fact the male could not be driven near it. The female took two or three days in its construction. He has also seen the female take a cracked egg out of the nest and carry it to water and then drop it in. Although the male never visited the nest during incubation and never whistled loudly at this time, he would watch very intently for his mate to come off the nest in the evening to feed. The same pair always stayed mated until one of them died and the female would never mate with more than one drake. If the male died, his mate did not breed the next year. The male, however, would attach himself to more than one female if he could. (Behavior such as this cannot be considered the rule in the wild, as captivity often distorts the sex instincts to a marked degree.) But if there were

only one drake, the ducks quarreled amongst themselves for his attentions and interfered with one another's breeding plans. The same was true if there was only one duck and several drakes.

Dr. Warren found this species hardy and long-lived but he has lost some from tuberculosis. Under the same conditions he found the Blue-winged Teal (*Anas discors*) too tender to be of any use at all.

Hybrids. Wild hybrids are extremely rare. Some people have the impression that duck hybrids of many sorts are common, but when we remember the millions of ducks which annually pass through the hands of observant sportsmen or market men, many of whom could not fail to notice such striking hybrids as those between Teal, Mallard, Widgeon and Shovellers, we must conclude that mixtures between the ducks in the natural state are very unusual indeed. Of course it goes without saying that few hybrids except full-plumaged males ever reach the hands of the ornithologist because female hybrids are rarely recognized. I find but one wild hybrid described: *Anas carolinensis* × *Anas boschas* (W. Stone, 1903a).

FORMOSAN TEAL

ANAS FORMOSA GEORGI

(Plate 33)

SYNONYMY

Anas formosa Georgi, Reise Russ. Reich., p. 168, 1775.

Anas glocitans Pallas, Kongl. Vet. Acad. Handl., Stockholm, ser. 1, vol. 40, pp. 26, 33, 1779.

Anas baikal Bonnaterre, Encyclop. Méthodique, vol. 1, p. 158, 1791.

Querquedula formosa Stephens, General Zool., vol. 12, pt. 2, p. 151, 1824.

Querquedula glocitans Boie, Oken's Isis, 1828, col. 329.

Anas perpulchra Yarrell, Report Council Zool. Soc. London, 1831, p. 22.

Anas cucullata Fischer, Bull. Soc. Imp. des Nat. Moscow, vol. 3, p. 279, 1831.

Dafila ? cucullata G. R. Gray, Genera Birds, vol. 3, p. 615, 1845.

Eunetta formosa Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.

Aix formosa Swinhoe, Ibis, ser. 2, vol. 3, pp. 394, 409, 1867.

Querquedula bimaculata Fritsch (*nec auct.*), Vögel Europa's, p. 418, pl. 47, figs. 7, 11, 1870.

Eunetta glocitans Prjevalski, in Rowley's Ornith. Miscellany, vol. 3, p. 105, 1878.

Nettion formosa Giglioli, Avifauna Ital., p. 312, 1886.

Nettion formosum Salvadori, Cat. Birds British Mus., vol. 27, p. 240, 1895.

VERNACULAR NAMES

English: Formosan Teal, Baikal Teal, Clucking Teal, Spectacled Teal, Japanese Teal.

German: Prachtente, Japanische Ente, Brillen-Kriechente, Zierente.

French: Sarcelle formose, Sarcelle du Japon, Canard glosseur.

Italian: Alzavola asiatica.

Dutch: Japansche Taling.

Russo-Siberian: Klokonchka.

Mongolian: Alak-tarikitu.

Japanese: Ajigamo, Tomoyegamo.

Yakut: Marodu.

DESCRIPTION

ADULT MALE: Top of the head, a patch at the back of the neck, chin and throat, and a bridle-like stripe across the face, black. Remainder of face buff, margined with more or less white. Extending back from each eye, meeting at the occiput and continuing as a triangle down sides of neck is a bril-

FORMOSAN TEAL

liant metallic-green patch, bordered in front with a black stripe, and behind by a white one. Mantle and scapulars very finely vermiculated with gray and black, or plain brown, but the inner scapulars highly ornate, like the tertials. Back, rump and tail grayish brown. Lower neck and upper breast vinaceous, thickly covered with round blackish spots, which extend posteriorly on to the white or cream-colored part of the breast. On the sides of the breast at the bend of the wing is a crescentic white band. Rest of lower surface white, except the under tail-coverts, which are black in the middle and chestnut on the sides. Flanks finely vermiculated, slate-gray like the mantle Outer wing-coverts uniform brown, except the tips of the greater ones which are cinnamon, forming an anterior speculum band. Speculum itself black and glossy green, with a white posterior band; primaries brown. The longer tertials are sharply pointed and highly colored with black, white and cinnamon. Under wing-coverts brownish.

Iris dark brown. Bill blue-black or "dark bluish brown." Legs and feet bluish or yellowish gray, dusky on the webs.

Wing 200–216 mm.; bill 35–38; tarsus 34–37.

Weight 18 ounces (0.50 kilograms) (Latham).

Adult Female: A plain brown duck, somewhat like the female European Teal, but darker on the mantle and scapulars, and easily distinguished in the field by the round white spot at the base of the culmen, as well as by the larger size. The head is very dark on top, and there is an indication of a face pattern in the light superciliary streak, as well as in a light patch in the center of the cheek, behind the eye, and at the base of the culmen. Feathers of mantle and scapulars with black centers. Ornamental tertials not present. Wing same as in male. Upper breast spotted or streaked, rest of lower parts white or cream colored.

Iris dark brown. Bill dull lead-color, freckled more or less on the culmen. Legs and feet as in male.

Wing 190–198 mm.; bill 33–36; tarsus 32–35.

Immature Female: Specimens in late August are very similar in general appearance to the adult female. The lower abdomen is, however, spotted or streaked with brown and the tail-feathers are blunt.

Immature Male: At first very much like the young female but probably always distinguished by the presence of light barring on the feathers of the mantle (a character of some importance in other species) and the absence of the white spot at the base of the culmen. By October the spots on the breast become more prominent and finely vermiculated feathers begin to appear on the mantle, scapulars and flanks. By December the body plumage may be nearly complete but the face pattern still remains obscured. Adult head plumage does not appear to be complete until late winter.

Male in Eclipse: There is a general resemblance to the adult female, but not so close as in many other species. The top of the head and nape are of a more uniform brown. The sides of the head are different. The conspicuous white spot at the base of the culmen is much reduced, and the light area, which in the female extends from the throat up to the cheeks, is absent. The mantle and scapulars are more uniform, and the edges of the feathers are rusty in color. The upper breast inclines to a wine color, and the sides and flanks are rusty. The ornamental scapulars of winter plumage are absent. Speculum as in winter plumage. A few vermiculated feathers may be distinguished in the mantle and scapulars (Museum of Comparative Zoölogy specimen). A. von Middendorff (1853) described this plumage from males shot at the end of July or in early August.

Young in Down: A. von Middendorff says it is easily recognized by the spot at the base of the bill and by the stripe through the eye, which are the same as in the old female, but yellowish instead of white. I have not seen specimens.

DISTRIBUTION

THERE is, so far as I know, no absolutely reliable information concerning the extent of the breeding range of this species. In general it lies in northern and eastern Siberia, between the 48th and 71st or 72d parallels of latitude, and the 80th and 175th meridians of longitude east from Greenwich. It has never been recorded as breeding much to the west of the Jenesei River, but A. von Middendorff (1853) tells us it is the commonest duck on the Boganida (70° north latitude) not going as far north, however, as the Taimyr River (latitude 72° north). Recently Johansen (Mess. Ornith., 1912, p. 287) has recorded six specimens shot from a flock in May on the River Toma, Tomsk Government. He says the species also appears in autumn, but it is apparently a rather rare bird. It breeds in this region, as also much farther to the east on the Aim River in the Stanowoi Mountains (58° north). Along the Arctic coast of Asia we have it recorded breeding abundantly at the mouth of the Kolyma River (Thayer and Bangs, 1914; Riley, 1918; Dresser, 1906), and in the extreme east it was taken at the very end of May, 1906, on the Anadyr River (Bianchi, 1908), where I presume it must breed. It has been taken on the Commander Islands (Bianchi, 1909; Hartert, 1920) as well as in Kamchatka (Dybowski, *fide* Taczanowski, 1893) in which latter locality it may very likely breed, though at Gichiga it was seen only on passage (J. A. Allen, 1905). Von Bunge and Toll (1887) found a nest on Great Liakoff Island, off the Arctic coast of Siberia, but Schalow (1906) very justly calls in question this extraordinary record. No actual specimens have ever been taken so far north. Von Bunge (1883) found the birds common in flocks up to thirty or so in late June at Sagastyr in the Lena delta, but adds that these were all males, and that the natives told him about the occasional occurrences of females, saying, however, that they never bred there. It seems to be a fairly well-established fact that flocks of males fly as far north as the Arctic coast of Siberia while the females are incubating, and I hardly believe that the species breeds north of the 71st parallel of latitude. Farther south it has been taken at Jeneseisk on the middle Jenesei by Popham (1898). Suschkin (1913) says it straggles to Minussinsk on the upper Jenesei, and Dybowski (Taczanowski, 1873) states that it breeds near Darasun in Dauria, east of Lake Baikal. On the other hand Radde (1863) claims that it does not occur on Lake Baikal in summer, and Buturlin (1908) gives the 59th parallel as its southern limit on the Lena River. Probably it breeds in restricted numbers east of Lake Baikal and throughout the Stanowoi Mountains. At any rate it breeds in the Amur country (Baker, 1908) and possibly on Saghalin Island (Nikolski, *fide* Taczanowski, 1893) though hardly as far south as the lower Ussuri and the Suiffan River regions. On Yezo it has been seen in the spring and autumn (Stejneger, 1893).

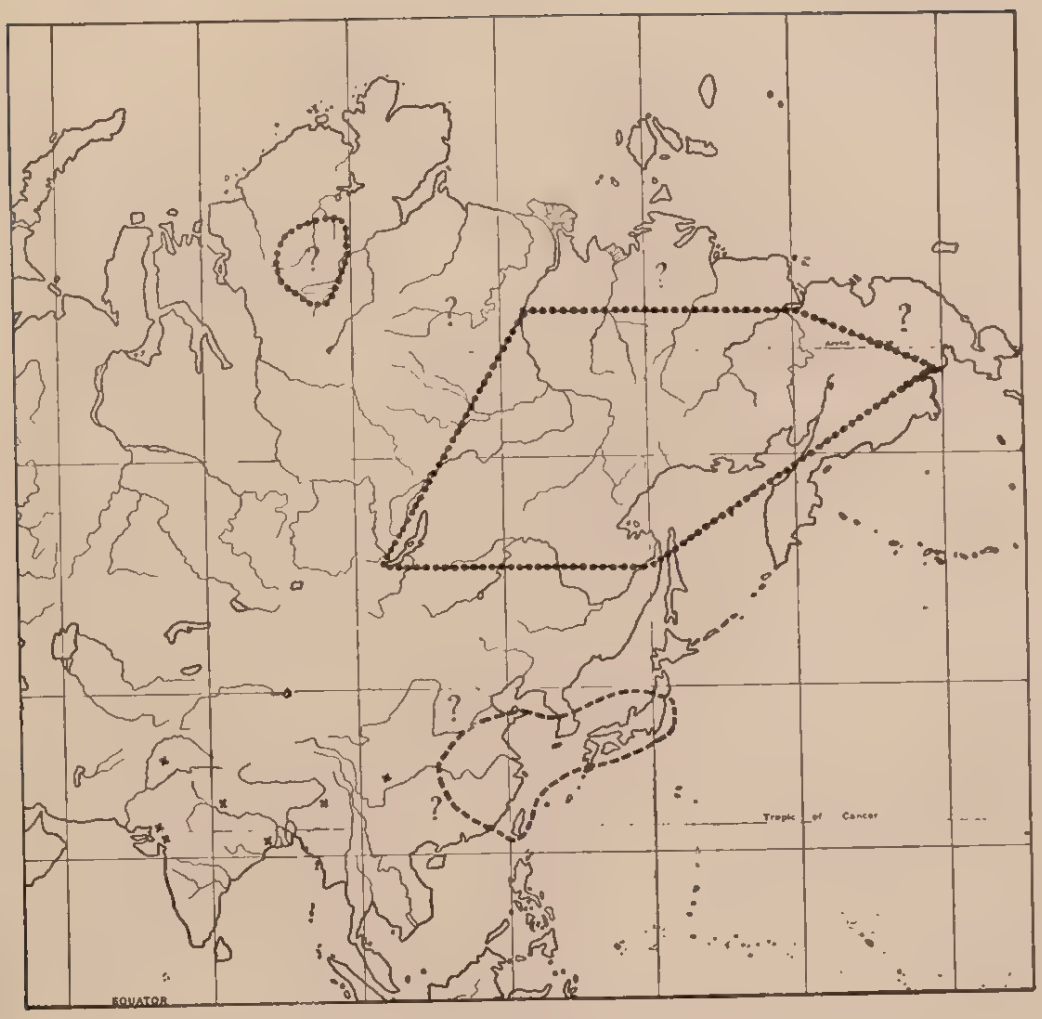
Siberia

Kamchatka

In the regions lying between the 48th and 55th parallels it is chiefly, if not wholly, a bird of passage, coming from the south, where it winters throughout China and Japan. Excluding the deserts of Mongolia it winters south perhaps to the 20th parallel and west to about 105° east longitude. E. H. Wilson (1913) found it in winter in western China near Kiating, Thayer and Bangs (1912) report a specimen taken on November 26, 1907, in the Hupeh Province, central China, and La Touche (1922) found it common in that Province in winter. Styan (1891) speaks of it as common on the lower Yangtse, and Wade (1895) says the same about the vicinity of Shanghai. R. Swinhoe (1873) reports it as fairly common at Ningpo, and La Touche (1892) states that it stays till March at Kiu-kiang in the interior. R. Swinhoe (1863) and Uchida (1912) have recorded it for Formosa, and Styan (1891) speaks of it as common at Foochow, occurring also at Swatow. On the whole it may be said to be very common in winter throughout southern and eastern China, as well as in Japan, especially in the southern districts. Blakiston and Pryer (1882) speak of it as common about Tokio, and even north of it, while Seebohm (1892) says it frequents Tsushima (between the southern extremity of Japan and Korea) in flocks numbering hundreds during the winter. In Korea proper, however, as well as throughout northernmost China, Mongolia and Manchuria it is really a bird of passage rather than a winter guest.

China

Japan



MAP 47. Distribution of Formosan Teal (*Anas formosa*)

Breeding range, dotted line; winter range, broken line
Sporadic records indicated by crosses (×); areas where status is unknown or doubtful, by interrogation marks (?)

Migration

The migration of this species presents no peculiarities. Traveling in large flocks they leave their winter quarters apparently in the middle of March, reaching Mongolia toward the end of the same month or in early April (Prjevalski, 1878). In Dauria and the vicinity of Lake Baikal they have been reported as arriving during the second half of April (Taczanowski, 1893) and the middle of May (Taczanowski, 1873). Von Schrenck (1859) states that on the lower Amur they were first seen in late April and early May, but Radde (1863), speaking perhaps of regions farther to the west, gives the date of arrival as March 26. On the Suiffan and lower Ussuri Rivers they were seen in late March (Bolau, 1881) and Dorries (1888) says some stay as late as the end of May! But on Lake Hanka, according to Prjevalski (1878), they arrive during the second half of March and first half of April, none being seen after May 15. Farther north at the mouth of the Kolyma River they arrive as late as May 31 (Thayer and Bangs, 1914) and proceed to nest immediately, while on the Boganida, far in the northwest, A. von Middendorff (1853) tells us they do not arrive before June 12, after which date they are found nesting.

Practically no data are to be found concerning the autumn migration, excepting that they leave the Boganida by August 23 (A. von Middendorff, 1853) and pass Lake Baikal going south. In this connection Taczanowski (1893) remarks that these Teal are rarely observed in autumn, and that they pass very suddenly. We have no record of the occurrence of the species on Yezo or on the Kuriles, but it unquestionably passes over the former, and very probably occurs on the latter islands.

The Formosan Teal has occurred a few times in India, usually in winter, specimens having been taken in Calcutta, 1844; Sultanpore near Delhi, 1879; Guzerat; and lastly in the Punjab, in Sind and in Assam (Hume and Marshall, 1879; Baker, 1908; Finn, 1909). Degland and Gerbe (1867) mention five specimens taken on the Saône, near Epervans, in France in November, 1836, and one taken at Douai in 1841. Ghidini (Rev. Ital. di Ornit., 1915) speaks of four records for Italy, one of which undoubtedly is that of an example shot at Modena in December, 1882. Recently a specimen was taken from a company of three, on the Island of Malta (Despott, 1917). In the Netherlands it has been taken near Brussels in November, 1888 (Dubois, 1890), and at Groningen in March (Leege, 1910). More recently nine or ten specimens, said to have been taken in Limburg, were found in the Brussels Market, but these had probably been imported from China (Dubois, 1912), and of the other specimens the majority are very likely birds escaped from zoölogical gardens. Procter recorded a case of its nesting in Iceland in 1837, but it is difficult to conceive of this record being true. Hantzsch (1905) suggests that the capture of four specimens in France in the preceding year may indicate a rather large flight in Europe, of which a few found their way to Iceland and possibly even bred. I am equally at a loss to explain the statement of Daniloff (1864) that the species summers and breeds in the southeastern part of the Orel Government in central Russia. The author must unquestionably have mistaken the species.

GENERAL HABITS

Haunts. Our information about the habits of this little duck is too meager to justify comparison with those of the European Teal. The Formosan Teal is certainly not closely related to the true Teals, and the voice, general behavior and appearance are quite distinctive. According to a note by Dörries (1888) no other duck in the Ussuri region is seen so much in the dry fields, and it is also said to frequent rice-fields in China (Styan, 1891; Seebohm, 1892). I know of nothing really characteristic in its choice of surroundings. In the field the adult male is unmistakable, while the female is easily recognized by the white spot at the base

of the culmen which is so prominent as to mark the bird instantly when among Common Teal.

Wariness. So far as known this species is as wary as most other ducks in the same region. A. von Middendorff (1853) found it very shy when in flocks, but less so when paired; and in spite of the fact that it is a very common bird on the lower Yangtse, comparatively few are shot (Styan, 1891).

Daily Movements. There are no special observations on its daily movements and I presume that it is similar to many other true ducks in being crepuscular in its habits.

Gait, Swimming, Diving. In its posture and movements there is nothing characteristic or remarkable. It never dives, and when on the water looks very like some of the other Teal. Finn (1915) referred to it as standing higher on its legs and running more actively than the Common Teal and Garganey, but I cannot say that I ever noticed this. The bird is larger and heavier than the Common Teal and its legs are proportionally longer.

Flight. No one has yet given a careful description of the flight either in the individual bird or in flocks. The birds usually live in companies of from fifteen to thirty (von Bunge, 1883; Dörries, 1888) but in winter they collect in immense flocks on the lower Yangtse (Styan, 1891). I do not know whether the movements of a flock are as erratic and ploverlike as in the Common Teal (*Anas crecca*).

Association with other Species. Judging from their behavior on enclosed waters I should say that these birds are very independent and slow to mingle with other water-fowl. The same trait seems to be characteristic in the field. Taczanowski (1893) says they rarely mingle with other species, and Styan (1891) tells us that on the lower Yangtse they are not found with the Common Teal. Radde (1863), however, writing of the spring migration in the upper Amur country, says he once saw Formosan Teal resting on a bank with Mallard, Teal, Shovellers, Pintails and a few Widgeon.

Voice. Any one who has visited collections of water-fowl in the spring can hardly have failed to hear the extraordinary note of the male Formosan Teal, which is entirely different from that of any other species. It is a very un-ducklike, dissyllabic note, which might be written *wut-wot* sometimes followed by a more slowly uttered *wot-wot-wot* repeated ten to fifteen times when the bird is greatly excited. Others have transliterated this call as *clock-clock*, *ruck-ruck* or even *mok-mok*. There is a

different quality to the two syllables, but the distinction is very subtle and impossible to describe. The female has a rather faint, but typically ducklike *quack* which is used as an alarm-note. Heinroth (1911) describes it as similar to that of the female Common Teal or female Yellow-billed Teal, a resounding *quegquegquegquegqueg*. The female has also been spoken of as occasionally bursting out "with a loud, harsh, jarring note, calling to mind the cry of some large Halcyon" (R. Swinhoe, 1867). I myself have never heard the female make any sound except when she was frightened or disturbed.

The males are said to call even when on the wing (Prjevalski, 1878). The trachea of the male, as figured by Eyton (1838), has a dilatation at the bifurcation on the left side. It is very small and quite Teal-like. In my specimen it is only 10 mm. long by 7 mm. in breadth, scarcely the width of both bronchi. The trachea itself is simple in form and 140 mm. long.

Food. I know of no analysis of food contents, and can only quote Seebohm's (1892) note that in Tsushima hundreds of the birds are seen feeding in the rice-fields.

Courtship and Nesting. The display in this species is described by Wormald (1907) and Finn (1915). The former says that when showing off "the drake lowers his head and then throws it up, at the same time elevating the feathers on the top of his head so that they appear almost like a crest, and muttering his note . . . which he keeps up for hours on end." According to Finn the display is generally seen on land. He speaks of the bird erecting the plumage on its head so that this part seems larger than it really is, and then jerking the head back on the shoulders, clucking vigorously. I have never seen my Formosan Teal throw the head back on the shoulders, but they do often throw out the feathers of the head and bob the head up and down.

The breeding season appears to be rather late, though Baker (1908) says he has an egg in his collection taken in the Amur region on April 28. This date is, to say the least, very exceptional. In the Kolyma delta, Mr. J. Koren, collecting for Thayer and Bangs (1914) took an egg from the oviduct of a female that was ready for laying on June 7. Sets of fresh eggs were taken on June 19, 22, and 27. Riley (1918) records a clutch from the same region, which, on July 9, was five or six days incubated. A. von Middendorff (1853) found fresh eggs on the lower Amur on July 3, and on the lower Jana eggs were found in early June, and young almost fledged on July 26 (von Bunge and Toll, 1887).

The nest is often placed in a dry situation. One of those described by Thayer and Bangs (1914) was under the drooping branch of a larch tree, another in a patch of creeping willow on a grassy hillside at the edge of a forest, while a third was well concealed in a pile of driftwood on an island in the delta of the Kolyma. Riley (1918)

describes one from the same region that was on a "niggerhead" in an open swamp, one hundred yards from a pond.

So few nests have been listed that it is impossible to give the average number of eggs for a full clutch. It seems, however, to be rather less than for either the Common Teal or the Mallard; it is perhaps eight, the maximum ten (Pallas, 1831). The eggs are like those of the Common Teal, but somewhat larger than the Garganey's; in color they are pale grayish green and very similar to the Mallard's (Taczanowski, 1893). The average size of twenty-two eggs is 48.67 by 34.48 mm., the maximum length 52.5 mm., and the maximum breadth 36 mm., the minimum being 45 and 32.5 mm., respectively. The period of incubation is unknown. During this period the males evidently flock together and change their location as soon as incubation is well started. Von Bunge (1883) writing of the mouth of the Lena says the males appeared there and became common after June 18. The females, which were occasionally found, seemed to be non-breeding birds, as the region is well north of the actual breeding range. A northward excursion beyond the breeding range is probably a common phenomenon with many ducks, and one has to use great caution in constructing an accurate map of the breeding area on this account.

Status. This is a very abundant species throughout northeastern Siberia. There it seems to equal, if not to exceed in numbers, the commoner shoal-water ducks. At the mouth of the Kolyma it is the commonest breeding surface-feeding duck (Thayer and Bangs, 1914). It is more common than the Mallard or Common Teal in the Amur region (von Schrenck, 1859) and in the Ussuri country it was third in number among the ducks (Dörries, 1888). On its wintering grounds in the Yangtse basin, Styan (1891) says comparatively few are shot considering the great numbers of them, but in the Ningpo Market, R. Swinhoe (1873) found them about as common as the Mallard, Spot-bill, Teal, Shoveller, Pintail, Widgeon and Falcated Teal.

Enemies. Nothing recorded.

Damage. Nothing recorded.

Food Value. This Teal is said by H. A. Walton (1903) to be good eating.

Hunt. These birds were imported into European markets from China (Ghidini, 1911) but only in small quantities. They are probably trapped with ease by the Chinese, considering the numbers that have been imported alive into this country, into Europe and even into Australia.

Behavior in Captivity. This Teal was imported into England at an early date, and bred in the London Gardens in the years 1840, 1841, 1842 and 1843. P. L. Sclater (1880) thinks it did so even earlier on the Earl of Derby's estate at Knowsley. The species was then lost, and was not re-introduced in the London Gardens until 1867, and to my knowledge it has not again bred there. In more recent times Earl Grey of Falloden (*in litt.*) succeeded in rearing them, but none of his young birds showed any disposition to nest. Millais (1913) states that a pair bred on the estate of Sir Richard Graham at Netherby in 1912 and succeeded in rearing a fine brood. They are supposed to have flown from Mr. Maurice Portal's ponds at Hexham in Northumberland, where there were several full-winged pairs.

Mr. Seth-Smith of the London Gardens told me of a pair in Regents Park that laid a single egg and then deserted the nest. Lord William Percy spoke of breeding them in Northumberland, but Mr. Blaauw of Holland has never had any luck with this Teal.

In Holland the species was first induced to nest in 1872 and again in 1873 by Polvliet of Rotterdam (Geoffroy St. Hilaire, 1872, 1873). He paid 440 francs for this pair, which laid six eggs, all infertile. Subsequently Courtois (1880) got a pair to lay after he had had them four or five years, and in 1881 (Courtois, 1881) this pair laid eight eggs, which the female incubated. Six were reared. In the Berlin Gardens it apparently did not breed until 1914 (Heinroth, 1915a).

So far as I can discover the Formosan Teal has never been bred in this country It is one of the most attractive of the small ducks, and is a great addition to any collection of water-fowl. However, it must be classed among the more difficult species to breed in captivity, and undoubtedly the best results are to be obtained from full-winged birds.

Until about the year 1910 these Teal were always scarce in the dealers' shops. Wormald (1907) mentions the price of £50 having been asked for a pair, and Miss Rose Hubbard (1907) was told that when first imported they brought £20 to £30 a pair; but by 1907 the price had dropped to five guineas and upward. About 1911 it became one of the commonest water-fowl imported into Europe, and the price became correspondingly low. At the same time they were being imported in large numbers from Shanghai to Australia, as many as three hundred going on one ship. Similar consignments were shipped on every voyage. In 1914 the price in this country had dropped as low as $6.00 per pair, and so many were brought to San Francisco that they could not be disposed of. During the War no birds reached this country, but in the years 1919–20 some forty-four were recorded as having arrived in San Francisco.

The few pairs I have kept showed themselves hardier than Blue-winged or even Green-winged Teal. Twenty-one specimens in the London Gardens averaged four years, and the maximum length of life was twelve and a half years.

It is interesting to note that captive males come into eclipse later than most other ducks. In my pond on July 12, Widgeon, Mallard, Red-heads and Carolina Ducks were far advanced toward perfect eclipse, but three Formosan males had apparently not shed a single feather.

HYBRIDS. One hybrid has been recorded (*Anas formosa* × *Anas penelope*) and it is not certain whether this was wild-killed or artificially reared (Van Kempen, 1890). I saw in the Tring Museum the product of a cross between this and the Common Teal bred at Regents Park, London.

CHESTNUT-BREASTED TEAL

ANAS CASTANEA (EYTON)

(Plate 34)

SYNONYMY

Anas punctata Cuvier, MS.; Lesson (*nec* Burchell), Traité d'Ornith., p. 634, 1831.
Mareca castanea Eyton, Monograph Anatidæ, p. 119, pl. 22, 1838.
Mareca punctata G. R. Gray, List Birds British Mus., vol. 4, p. 134, 1844.
Querquedula punctata Lichtenstein, Nomenclator Avium Mus. Berol., p. 102, 1854.
Anas castanea A. Newton, Proc. Zool. Soc. London, 1871, p. 649, note.
Virago castanea Stejneger, Standard Nat. Hist., vol. 4, p. 145, 1885.
Nettion castaneum Salvadori, Cat. Birds British Mus., vol. 27, p. 252, 1895.

VERNACULAR NAMES

English: Chestnut-breasted Teal, Green-headed Teal, Australian Teal.
German: Kastanien-Ente, Australische Krickente.

DESCRIPTION

ADULT MALE: Head and neck dark glossy green. Mantle and scapulars black, the feathers edged with lighter color. Rump and tail nearly black. Breast and abdomen chestnut, with round black spots, more numerous on abdomen. Spots on the sides and flanks larger. On the lower flank is a whitish-buff band, bordering exteriorly the black under tail-coverts. Outer wing-coverts brown, except the last row which are white. Speculum black, except for two or three feathers which are metallic copper-colored and green. There is a posterior white speculum-band; primaries brown. Under wing-coverts brown and white; axillars white.

"Bill bluish lead-color, nail and the edges of the upper mandible black, the under mandible crossed near the tip by a band of reddish flesh-color; irides hazel; feet lead-color, with the membranes of a somewhat darker hue" (Gould). According to Mathews the iris is "blood-red."

Wing 205–219 mm. (according to Mathews up to 223 mm.); tarsus 36–40; culmen 38–41.

Weight up to 3 pounds, 1 ounce per pair according to Keartland (1890). Males from 17 to 19 ounces (0.48 to 0.53 kilograms) (W. B. Alexander, 1916, p. 29).

ADULT FEMALE: Top of head black, with light edges to some of the feathers. Sides of head paler, thickly streaked with black. Chin and throat paler, nearly immaculate. Upper parts dark brown, the feathers edged with gray or brown. Lower parts brown with black spots formed by the centers of the feathers. Under tail-coverts darker than abdomen. Wing as in male. Colors of soft parts same as in male (?).

Wing 191–205 mm.; bill 36–37; tarsus 34–36.

IMMATURE FEMALE: Resembles adult female, but the black markings on the feathers of the breast are absent (Blaauw, 1916).

IMMATURE MALE: At first like female, but about the time when the young female begins to assume the black breast-spots, the young male becomes black on the throat (Blaauw, 1916). According to Mathews the speculum is green, and not coppery red.

MALE IN ECLIPSE PLUMAGE: It does not seem to be known just how much of an eclipse plumage is assumed. Mr. Blaauw thinks that the adult males "go back" in color a good deal after the breeding season, and for a while the bright colors are clouded over, even the white areas being less bright. It is indeed a curious fact that males in adult plumage should be so uncommon in this species, and really fine specimens are rare in museums.

YOUNG IN DOWN: Very like the Mallard and the Common Teal and about the same color above and below, although some specimens at Tring appeared very dark above and nearly pure white underneath. It is to be distinguished from the young of the Mallard by a very broad superciliary buff-colored stripe running back nearly to the occiput. The trans-ocular stripe is usually broader and blacker than in the Mallard and extends farther forward. There is usually a well-marked face streak from near the bill to the aural region, but sometimes this is irregular or poorly defined. The light-colored body spots are the same as in the Common Teal or the Mallard. The nestling of this species is said to be darker than the young of the Gray Teal, *Anas gibberifrons*.

DISTRIBUTION

THE confusion between this species and the Gray Teal (*Anas gibberifrons*), which so long occupied ornithologists, makes it almost impossible to determine the range with any degree of accuracy. Not only many of the older records, but also a number of the more recent ones, undoubtedly refer to the Gray Teal.

The present species probably does not occur outside Australia, Tasmania and possibly New Zealand. Earlier writers have recorded it from such diverse localities as Java, Celebes, Sumba, New Caledonia and New Guinea, but Meyer and Wiglesworth (1898) who discuss the various references to these places, conclude (and I think rightly) that all of these records refer to *Anas gibberifrons*, which is practically indistinguishable from the females of *Anas castanea*.

Australia

In Australia this species does not seem to be anywhere very common. It appears to be essentially a coastal bird and is rarely, if ever, found in any numbers inland. Carter (in Mathews, 1914–15) reported thousands on Lake Muir, West Australia, but in a more recent article (Carter and Mathews, 1920) they speak of it as very scarce there in 1916. Carter was told that it occurred north of Carnarvon. Other records for West Australia are those for Moora (Orton and Sandland, 1913), for the Houtman Rocks (R. Hall, 1902) and Bremer Bay (W. B. Alexander, 1916). C. G. Gibson (1909) took one at Belladonia and saw some thirty birds on the reef near Eyre. Farther north Carter (1910) met with it in some numbers on the Northwest Cape and found it also on the Salt (Pallenup) River, southeast of Broome Hill (*fide* Mathews, 1914–15). Ramsay (1888) has recorded the species for Derby, and Söderberg (1919) met with it in December on the Fitzroy River near Nooncanbah.

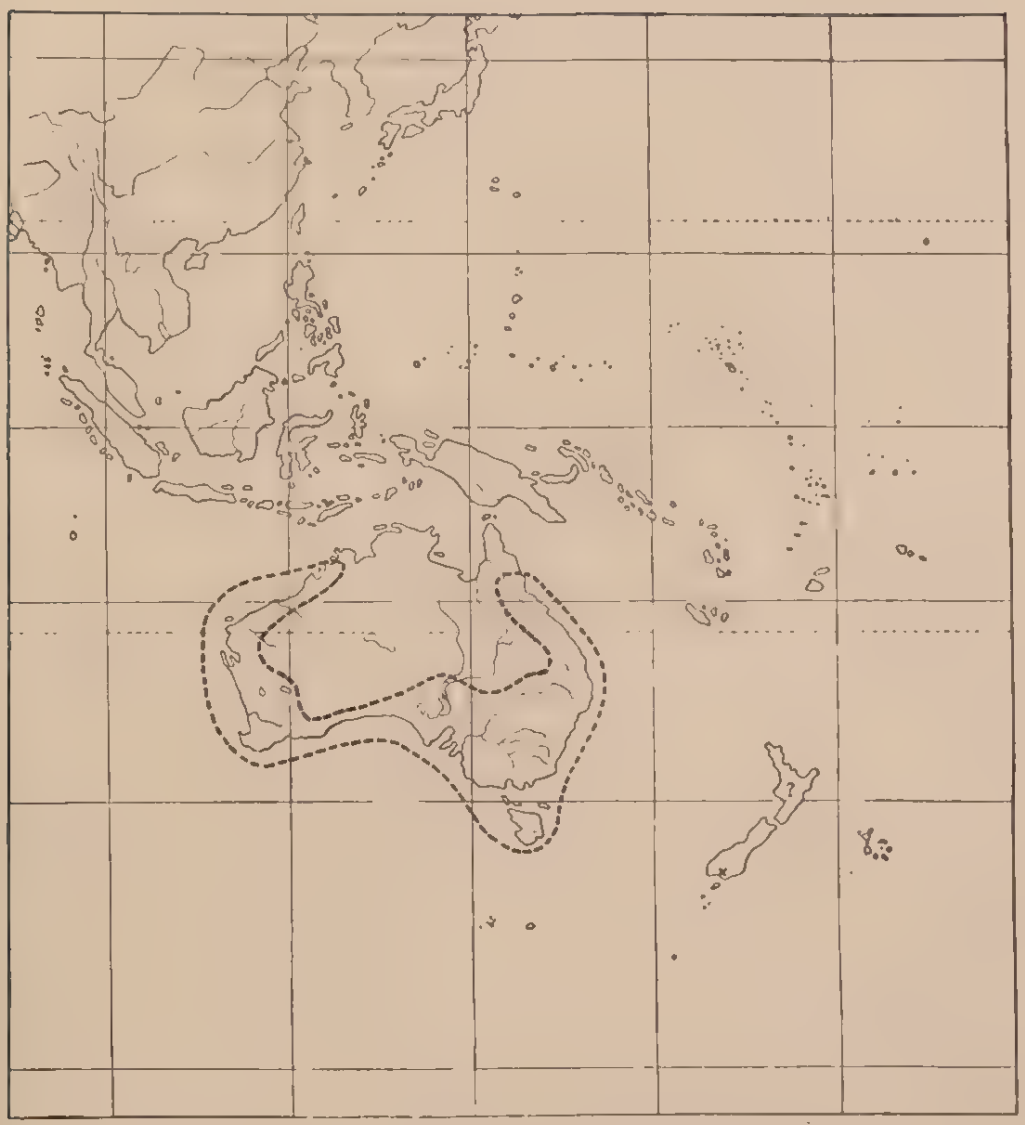
West Australia

There seem to be no records for the north coast of Australia, and even in Queensland it has not been recorded from any place north of Rockingham Bay. Ramsay (1888) mentions this as well as Port Denison and Wide Bay as specific localities where it was found in Queensland, and Ingram (1908) met with this Teal at Inkerman Station, North Queensland. It is said to be common at Peel Island which I have been unable to locate on the map (Agnew, 1921).

Queensland

It is a more common bird in New South Wales and has been recorded for the Richmond and Clarence River districts (Ramsay, 1888; Savidge, in North, 1913), the Mossgiel district (Bennett, in North, 1913), and is said to be a common breeder in the Mudgee district (Cox and Hamilton, 1889). R. Hall (1909) says it breeds in the Murray River region. The U.S.

New South Wales



MAP 48. Distribution of Chestnut-breasted Teal (*Anas castanea*)
Sporadic record indicated by cross (×); questionable record by interrogation mark (?)

National Museum has specimens from Bathurst and Tamworth. Sometimes it is common in the ponds in Sydney itself (A. S. Le Souef and Macpherson, 1920) and it is common to the extreme southeastern part of the country.

Victoria

In Victoria the species was formerly common (North, 1913) and it still seems to be so in certain districts such as Gippsland (Bennett, in North, 1913) though not plentiful about Melbourne (Keartland, in North, 1913). Miss Cheney called it frequent in the Wangaratta district (1915).

South Australia

It is far less known in South Australia, where it does not breed commonly (Mellor, in Mathews, 1914-15). It has been reported from Kellidie Bay, Eyre Peninsula (R. Hall, 1910) and the U.S. National Museum has specimens from Port Lincoln and Kangaroo Island.

Tasmania

On King Island, Bass Straits, the species seems to be a not uncommon nesting bird (A. G. Campbell, 1905) and the same is true of Tasmania, where it has been met with in numerous localities (Gould, 1865; Littler, 1910; Legge, 1905; Holden, in North, 1913).

New Zealand

Hutton and Drummond (1905) state that it breeds in the North Island of New Zealand, but that it is only occasional in the South Island (this probably refers to *Anas gibberifrons*). I know of no specific records excepting the one given by Buller (1905) for the Aorere River, where a pair were taken on June 1.

GENERAL HABITS

We know little of the habits of the Chestnut-breasted Teal, partly because it is a rare bird through most of its range, and partly because it has been so generally confused with the Slender or Gray Teal. The chief differences in the appearance and habits of the two species are as follows: in the first place, the present species is larger in both sexes, and the adult males have a strikingly brilliant sex-plumage. The male Chestnut-breasted Teal never has the bony frontal knob found in all old male specimens of the Gray Teal. Repeated experiments have shown that the present species breeds perfectly true, and all the males attain to full plumage in four or five months. When crossed with the Gray Teal, Blaauw (*in litt.*) found the resulting males to be intermediate between males of the two species (see under Hybrids).

A full discussion of the confusion and controversy concerning this and the next species is given by Mathews in his sumptuous work on Australian birds. I believe, in common with most others who have looked into the question, that he is entirely wrong in thinking that the female of this species ever, except perhaps for pathological reasons, assumes the male plumage.

The principal characteristics of the present species in the field are: its preference for the coastal regions, or, in the interior, its liking for high rocky shores, a trait which has given it the name of Mountain Teal in certain localities. It is also said to frequent large sheets of water in preference to swamps and morasses. The two species are only accidentally found together, and the nesting haunts seem to be quite distinct.

Wariness. It is said to be extremely wary and difficult to shoot, especially inland where it is much sought for by sportsmen (North, 1913).

DAILY MOVEMENTS. No information.

GAIT, SWIMMING, AND DIVING. The bird is said to be very fond of perching on boulders along rocky coasts (S. A. White, 1914b).

FLIGHT. The flight has been described as powerful and strong, and according to Savidge (in North, 1913) the bird looks much larger on the wing than when examined in the hand. This is characteristic, I think, of all Teal.

The flocks are always small, and S. A. White (1914b) says a dozen is the greatest number he has ever seen in any one locality. In only one place have they been reported as occurring in large numbers — Carter (1910) says he has seen thousands on Lake Muir, West Australia.

ASSOCIATION WITH OTHER SPECIES. It is not commonly found mixed with the Gray Teal, but in Tasmania a few have been seen in flocks of Australian Black Duck (Legge, 1905).

VOICE. There is a large osseous bulla on the trachea of the male, which is not present in the female (Ramsay, 1878). The confusion caused by A. Newton's (1871) statement that the female also has an enlargement was due to the fact that the supposed females turned out later to be males of *Anas gibberifrons*.

FOOD. No analyses of stomach contents have been reported on, so far as I know. R. Hall (1909) states that they feed largely on small red beetles that they pick from the blades of water-weeds, and that they avoid spiders.

Mr. Arthur M. Lea has kindly sent me the analysis of a stomach collected at Nannum in February. It contained many aquatic larvæ of insects, several small water-boatmen bugs, a small water-beetle, *Berosus australiæ*, and much coarse grit.

COURTSHIP AND NESTING. The display has never been described, and a pair in the New York Gardens has shown no sex activities. The breeding season cannot be definitely determined from the small number of nests actually found. No doubt it extends throughout the entire year, and is as irregular as with other Australian species. Carter (1904) took young in down on Northwest Cape on July 21, and North (1913) says August and the four following months constitute the usual breeding season in southern Australia and Tasmania. On the Murray River it is said to be the earliest duck to pair and nest (R. Hall, 1909), but of course it is a very rare duck there and it is doubtful if many nests have actually been taken.

On the Northwest Cape, Carter and Mathews (1920) say that it nests in the

GRAY TEAL

Female Male

CHESTNUT-BREASTED TEAL

Female Male

scrub and herbage around the mangrove swamps. A. J. Campbell (1901) states that it usually nests in hollow trees, but occasionally on the ground in grass or other herbage in the vicinity of water. Two nests described by North (1913) taken on the northwest coast of Tasmania, were situated on the ground between "earth-growing dwarf tea-trees," near the water. There is usually a plentiful supply of down, which is dark, each particle being whitish in the center with light-colored tips. A. J. Campbell (1901) thinks this down slightly darker than that of the Gray Teal.

The clutches vary from seven to thirteen, the average being nine or ten. In color the eggs are of a rich cream, measuring from 49–53 by 36.8 38.6 mm. The incubation period is not known, but it is probably not far from twenty-three days.

We do not know what becomes of the male during and after incubation, or whether he regularly assumes an eclipse plumage. I am inclined to think that a full eclipse is not assumed in the wild bird, although there are indications of it in captivity under northern climatic conditions.

STATUS. An idea of the rarity of this species may be obtained from the account of the distribution. Mr. Edwin Ashby of Blackwood, South Australia, who has kindly written me in detail about the water-fowl, refers to a Mr. Mann who in all his life spent on the Murray River had only taken it once or twice. Mr. Ashby himself had shot it once, and seen a few others in the same district. In April, 1920, he heard of a dozen for sale in a shop at Hobart, but he was unable to verify the information given him.

Mr. Belchambers writes me that they are now almost (?) gone from the lower Murray, and at Minnie Downs Mr. L. Reese (*in litt.*) says he has never seen it. There seems to be some reason to suppose that in earlier days it was more plentiful in Victoria (North, 1913), but older accounts of the two species are so confused that we can get little idea of the actual numbers of this bird. It most certainly does not represent more than one per cent of the combined population of the two species of Teal in Australia. Most of the recent notes of its occurrences in the principal Australian bird journal, The Emu, speak of the bird as occasional, but in several localities such as Wangaratta district of Victoria, around Sydney, and at Peel Isle, Queensland, it is reported as frequent.

ENEMIES. Probably the same as those mentioned under the Australian Black Duck (*Anas superciliosa*).

DAMAGE. None.

FOOD VALUE. "The flesh is tender and excellent eating" (Savidge, in North, 1913).

HUNT. The species is too scarce to be spoken of as a game bird, and should be protected by law, if such a thing were practical, which is doubtful.

BEHAVIOR IN CAPTIVITY. This is everywhere a rare species in confinement. It was procured by the London Gardens in 1870 (P. L. Sclater, 1880) but did not breed until recent years. Mr. D. Seth-Smith, Curator of Birds, has favored me with an account of his experiences with these Teal. In 1908 he brought home from Tasmania two pairs. One pair died soon after arrival, but the other pair has since bred freely, and the only fresh blood which has been introduced to keep up the stock was another typical red-breasted male from Tasmania. The young males all came into full plumage the first year and there has been no exception to this rule. A distinct seasonal eclipse is assumed by individual males, but Mr. Seth-Smith is a little uncertain whether this plumage is not sometimes "missed"; at least there was some irregularity about its assumption. Among English amateurs this species has, so far as I know, been bred only by Mr. Wormald and by Mr. St. Quintin. The latter reared a brood in 1918 which escaped (London Field, vol. 133, p. 12, 1919). Some of these nested when only one year old.

On the Continent the Chestnut-breasted Teal was recorded as having bred in the Gardens at Tours as early as 1883 (Noenty, 1884). In recent years it has been several times bred and reared by Mr. Blaauw on his estate at Gooilust, Holland. He notes that the males assume the adult plumage when five or six months old, the first change being that the throat becomes black. The females acquire the spots on the under side at the same period. Mr. Blaauw (1916) does not consider the males as having exactly an eclipse plumage, but "they go back in colour a good deal after the breeding season, and, for a while, the bright colours are clouded over — even the white spots are less bright."

There is a beautiful pair of this species in the New York Gardens, but as far as I know they have never been bred in this country.

HYBRIDS. Crosses are recorded between this species and the Brazilian Teal (*Anas brasiliensis*) (Poll, 1911), and with the Gray Teal (*Anas gibberifrons*). This latter cross was made by Mr. Blaauw, who writes me that the result was "an intermediate thing." The hybrid males have the chestnut breast only slightly developed and no glossy, purple-greenish heads like the pure male *castanea*. The white spots near the tail are clouded over. I think the results of this mating with the Gray Teal are very interesting, and good evidence, if any more was needed, that the two species are perfectly distinct.

I saw specimens at Tring which came from Regents Park, the result of crossing this Teal with the Yellow-billed Teal (*Anas flavirostris*).

GRAY TEAL

ANAS GIBBERIFRONS S. MÜLLER

(Plate 34)

SYNONYMY

Anas (Mareca) gibberifrons S. Müller, Verhand. Land- en Volkenk., p. 159, 1839–44.

Mareca gibberifrons G. R. Gray, Genera of Birds, vol. 3, p. 164, 1845.

Querquedula gibberifrons Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.

?*Anas punctata*, var., G. R. Gray, Proc. Zool. Soc. London, 1859, p. 166.

Anas gibbifrons Wallace, Proc. Zool. Soc. London, 1863, p. 487.

Anas muta S. Müller, *fide* Schlegel, Mus. d'Hist. Nat. des Pays-Bas, Anseres, p. 58, 1866.

Anas gracilis Buller, Ibis, ser. 2, vol. 5, p. 41, 1869.

Mareca castanea Marie (*nec* Eyton), Actes Soc. Linnéenne de Bordeaux, vol. 27, p. 328, 1870.

Nettion gibberifrons G. R. Gray, Hand-list Birds British Mus., vol. 3, p. 83, 1871.

Anas (Virago) castanea Ramsay, Proc. Linn. Soc. New South Wales, vol. 2, p. 200, 1877 (part).

Virago gibberifrons White, South Austr. Ornith., vol. 1, p. 11, 1914.

Additional synonymy under Geographical Races.

VERNACULAR NAMES

English: Slender Teal, Gray Teal, Wood Teal, Oceanic Teal, Mountain Teal.

German: Weisskehlige Ente.

Maori: Tete, Tete-moroiti, Pohoriki.

DESCRIPTION

ADULT MALE: Similar to the adult female of *Anas castanea*, and not certainly to be distinguished from that species, except by its smaller size. Probably nearly all old males have the characteristic bony protuberance on the forehead, but in a large series of twenty-eight males from Celebes in the United States National Museum, only six or eight are easily distinguished by this character. *Anas castanea* never has the bony protuberance. Many of these Celebes birds are darkly stained on the under parts and on the cheeks, but light-colored birds occur there, as well as in Java and Australia. There remains therefore only one test, and that is size.

Iris brown. Upper mandible of a bluish lead-color, mottled with black; lower mandible with the basal half and tip of a lead-color, the rest of the terminal portion orange-yellow. Legs of an olivaceous-slate color (Ogilvie-Grant, 1910).

Wing 175–206 mm. (according to Mathews); bill 36–39; tarsus 33–37.

Weight: Keartland (1890) gives the weight of the Gray Teal as 2 pounds 3 ounces per pair, as

against 3 pounds for the Chestnut-breasted Teal. In the present species the male weighed 1 pound 2 ounces (0.51 kilograms), and the female 1 pound 1 ounce (0.48 kilograms). It is therefore a considerably lighter bird than *Anas castanea*.

ADULT FEMALE: Like the male in all respects, and very nearly as large, but always lacking the bony protuberance on the forehead. In a series from Celebes which I measured the females ran from 165 to 185 mm. in the wing, as against 175 to 190 mm. in the males. Measurements given by Mathews show also that the females are of nearly the same size as the males. Soft parts are the same in color

IMMATURE SPECIMENS: Probably with less conspicuous markings on breast.

DOWNY YOUNG: A specimen in the U.S. National Museum taken in Celebes, August 4, 1917, is brown on the upper side and silver white below. Pileum almost black. A short superciliary light line and a dark stripe run through and beyond the eye. Under this a light stripe runs back to near the ear. A dark aural patch is present below this. Chin and throat buffy, separated from the breast by a sharply marked dark line. According to Mathews the young are lighter colored than those of *Anas castanea*, and the few specimens which I have seen bear this out.

DISTRIBUTION

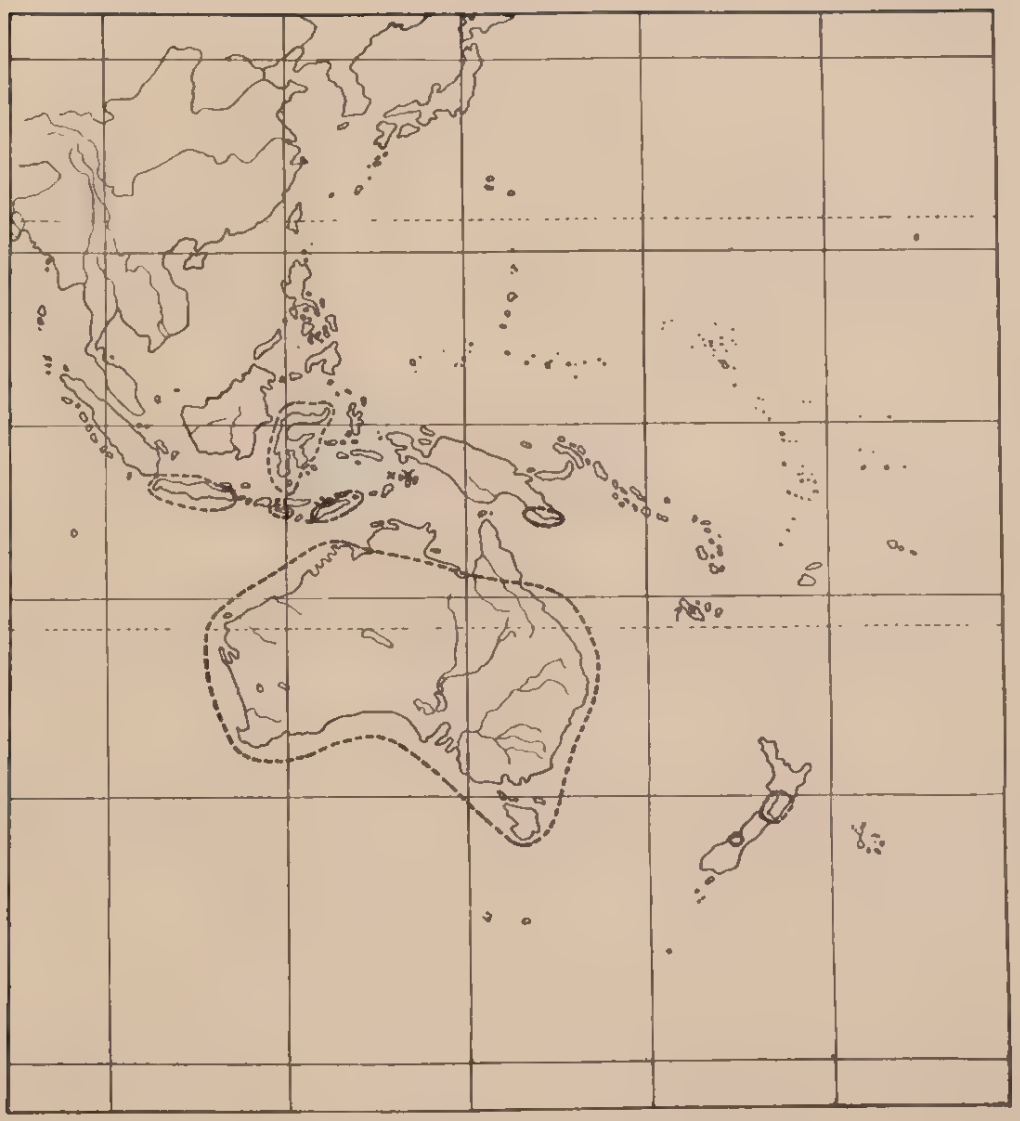
ON account of the general confusion between this species and *Anas castanea* it is almost impossible to fix with any degree of accuracy the range of either. Ornithologists are generally agreed that it is this species that inhabits the islands of the South Pacific, as well as Australia and New Zealand.

The westernmost limit of its range seems to be western Java, where it has been taken in the Batavia and Kramat districts (Vorderman, 1883). It is said to occur also in Borneo (Vorderman, 1887) and it is certainly very common in Celebes (Walden, 1872; W. Blasius, 1886; A. B. Meyer and Wiglesworth, 1898; U.S. National Museum; etc., etc.). Specimens have also been taken on Saleyer Island (Hartert, 1896b), Sumba (Hartert, 1896, 1898a), Flores (Wallace, 1863a), Timor (Hartert, 1898c), Wetter (Hartert, 1904a), Little Key Islands (Hartert, 1903, p. 254) and in the Aru group (Riedel, *fide* A. B. Meyer and Wiglesworth, 1898). Nothing is known of its status in Dutch or (former) German New Guinea, but in the southeastern part it is said to be fairly common about Port Moresby and South Cape (Ramsay, 1879). It was reported from New Caledonia by Verreaux and Des Murs (Rev. et Mag. Zool., ser. 2, vol. 12, p. 442, 1860) but apparently no collector has taken it on those islands since their time (Brasil, 1916).

Java
Celebes
Key Islands
Aru Islands
New Guinea

In Australia the Gray Teal is widely distributed and in many sections common. In West Australia it is common at Moora (Orton and Sandland, 1913) and on the Wongan Hills (Milligan, 1904). A few were seen on Lake Muir, and young were taken on the Minilya River (Carter and Mathews, 1920). In northwestern Australia it seems to be quite abundant (Ogilvie-Grant, 1910). Carter (1904) found it common on Northwest Cape, S. A. White (1915) took a few near the Alberga River, Hartert (1905) has recorded it for the Alligator River, for Derby and for Condon Road, while Keartland (North, 1898) found it the commonest duck and breeding on the Fitzroy River. Ramsay (1888) states that it is found on the Gulf of Carpentaria, and Ingram (1907) took specimens in the vicinity of Alexandra Station (19° south latitude, 136° east longitude). The species is apparently not found in the Cape York district of Queensland, but it is very common on the lakes at Sedan and Byromine (Macgillivray, 1914), on the Herbert River (Broadbent, 1910) and in the Richmond district (Berney, 1907). Ramsay (1888) has recorded it for the Wide Bay district. In New South Wales it is a very common bird (North, 1913). Ramsay (1888) has recorded it for the Clarence and Richmond River region and the interior, and Austin (1907) says great flocks arrive on the Talbragar River in

West Australia
Queensland
New South Wales



MAP 49. Distribution of Gray Teal (*Anas gibberifrons*)
Sporadic records indicated by crosses (×)

wet seasons. In Victoria also it is very common (Batey, 1907; A. C. Stone, 1912), while in South Australia it is a well-known bird at least in the eastern part. S. A. White (1914a) says it is far less common than formerly on the lower Murray River, but Mellor (in Mathews, 1914–15) says thousands are brought to the Adelaide Market. On Lakes Albert and Alexandrina it is fairly common (S. A. White, 1913) and it has been found far in the interior, common and breeding at Dalhousie (S. A. White, 1914) and a few on Cooper Creek (S. A. White, 1917). Recent contributors to The Emu, 1915–1922, show it to be still abundant in nearly all the watered regions of Australia from Victoria to the extreme west of the continent. South Australia

In Tasmania this species is quite common (Littler, 1910; and others). Tasmania

Its status in New Zealand is not wholly clear. Buller (1888) regards it as a rather rare bird, and got most of his from the Province of Wellington. If Hutton and Drummond's (1905) statement about *Anas castanea* refers to the present species it may be said that it breeds in the North Island, but occurs only occasionally in the South Island. According to W. W. Smith (1889) it is a common bird in parts of the Lake Brunner region (South Island). New Zealand

GENERAL HABITS

HAUNTS. It is not necessary to enter into the time-honored discussion concerning the systematic position of this and the Chestnut-breasted Teal. A full account of the facts in the case may be found in Mathews (1914–15). The present species has been bred in captivity, and there can no longer be any doubt as to its validity, though confusion in the field is unavoidable.

The Gray Teal, which seems to be second only to the Australian Black Duck in abundance, is found all over Australia on fresh-water creeks, rivers, lagoons and swamps, as well as on the salt-lakes, and on the seacoast.

WARINESS. This Teal is described by North (1913) as "exceedingly tame and easy to approach before disturbed by too much shooting." In places where not much shot the old birds will bring the young to the water-tanks close by the houses, and they become very tame (Carter, in Mathews, 1914–15). Gould (1865) found it extremely tame on the little-visited rivers of South Tasmania and in these localities it never failed to come flying back down the river over the heads of the party, as they were working up the streams in boats.

DAILY MOVEMENTS. No information.

GAIT, SWIMMING, DIVING. Nothing of interest has been recorded.

FLIGHT. The flight is rapid, but no faster than that of many other ducks. The white bar, anterior to the speculum, is said to be a conspicuous field-mark when the bird is on the wing (Mellor, in Mathews, 1914–15; Austin, in North, 1913). Gould (1865) considered it less active on the wing than the European Teal. It is a very gregarious bird and is frequently seen in large flocks, aggregating thousands.

Association with other Species. Keartland (in North, 1913) says the Gray Teal frequently associates with ducks of other species. Flocks of Gray Teal are sometimes accompanied by Chestnut-breasted Teal.

Voice. There is no adequate account of the call-notes in the two sexes. The female, it seems, utters a quick, sharp, quacking note, repeated six or eight times. According to Mellor (in Mathews, 1914–15) it sounds like *cack-cack-cack*, and is most commonly heard from birds on the wing at night. The male's note he describes as a "sharp little whistle, repeated in a jerky fashion in answering his mate."

The trachea of the male has a distinct membranous pouch not very different from that of the Mallard. It was figured by A. Newton (1871) who thought he was dealing with a female of *Anas castanea*.

Food. The food of this species has not yet been much studied. A few notes in the pages of The Emu and some unpublished MS. sent to me by Mr. Arthur M. Lea show that they take both animal and vegetable matter. Minute mollusks resembling a *Cantharadis*, other "river shells" and numerous "dock" seeds make up the list.

Courtship and Nesting. We do not know whether there is a definite type of display comparable to that characteristic of many northern ducks. As with all Australian ducks the breeding season is so irregular that no generalization is possible. Eggs have been taken in every month of the year, but the bulk of the nesting takes place after an unusually heavy rainfall, wherever surface water stays for any length of time. In eastern Australia, August and the four following months constitute the usual breeding season (North, 1913), and in West Australia it is said to nest later than the Australian Black Duck (Carter, in Mathews, 1914–15). In the Moree district of New South Wales it nests for fully nine months (F. C. Morse, 1922).

Wherever trees are available this Teal prefers to nest in hollow branches or trunks, especially in various species of gum trees. These nests may be twenty feet above the ground, and often are some distance from the water. Lacking these elevated situations the birds will nest on the ground, sometimes under a bush at a distance from the water, at other times in rushes or reeds near the edge of a swamp (North, 1913).

The clutch may vary from five to twelve eggs, the average being seven or eight, and the maximum fourteen (Macgillivray, 1914; A. C. Stone, 1912). As many as seventeen eggs have been found in one nest. The eggs are of a uniform cream color, close-grained and smooth. In size they vary from 47.5–51.6 by 34.8–38.6 mm. The incubation period is unknown. The male probably accompanies the brood after hatching. At least I am led to infer this from Carter's notes (in Mathews, 1914–15) concerning broods seen about his house. Among other things he says that he saw

four young birds flying with their adults. In another place he speaks of a brood of small young in down with the parents on one of his tanks.

STATUS. Enough has been said under Distribution to enable the reader to form a general idea as to their abundance. In some places they even exceed the Australian Black Duck in numbers, and in many localities they appear to be at least second in abundance. They are sent to the markets of Adelaide in thousands (Mellor, in Mathews, 1914–15) and are said to be still very numerous in the interior of South Australia (S. A. White, 1914). In North's (1913) opinion there has been no apparent diminution in numbers in New South Wales, where it is the most plentiful of all ducks, but on the lower Murray River it has diminished very greatly in recent years, and there is now only one where there were five hundred twenty years ago (S. A. White, 1914). A correspondent of mine, Mr. Belchambers, in a recent letter, confirms this observation.

ENEMIES. The enemies of Australian ducks have been discussed in connection with the Australian Black Duck (*Anas superciliosa*). North (1913) says the young of the Teal are preyed upon by water-rats, Black-cheeked Falcons and Harriers. The Whistling Eagle (*Haliastur sphenurus*) is said to be very fond of them (D. Le Souef, 1918a). The introduced enemies, including the fox, domestic cat, and ferret, are necessarily important factors in determining the future standing of this and other Australian species. One cannot help having grave misgivings as to the future of all birds on that ornithologically unhappy continent.

FOOD VALUE. The Gray Teal is an excellent bird for the table, and as aforesaid, great numbers are sold in the markets.

HUNT. "The Blacks on the Darling River capture large numbers in nets made for the purpose, seventy-three being caught in one haul at which I was present" (Bennett, in North, 1913).

BEHAVIOR IN CAPTIVITY. This has been one of the more uncommon ducks in confinement in Europe, and particularly so in America. The London Gardens acquired eighteen specimens in 1879, but of these none bred until 1882 when four were hatched and reared (P. L. Sclater, 1882). Later they bred a number of times, hatching their eggs in July. Among English amateurs the species has been bred by Mr. Wormald (*in litt.*). On the Continent it was successfully bred in Tours in 1883 (Noenty, 1884). So far as I know it has never been bred in this country, and has been seldom acquired excepting by the New York Zoölogical Society.

In England the price varied from £3 to £4 the pair before the War. In America

the New York Gardens paid only $10.00 each before the War. Among a large collection of Australian birds imported in 1920 by E. S. Joseph these ducks were quoted at $30.00 the pair.

Judging from longevity records of the London Gardens I should say that this Teal does very well in artificial conditions. The average length of life of eighteen specimens kept in those Gardens was six years three months, the maximum being seventeen years four months (P. C. Mitchell, 1911), both the average and the maximum exceeding those for other species of Teal.

HYBRIDS. The only wild hybrid of which I have any knowledge is a cross between this species and the Australian Shoveller (*Spatula rhynchotis*) described and figured by Zietz (1912). The crosses made by Mr. Blaauw between this species and the Chestnut-breasted Teal (*Anas castanea*) have already been mentioned under that species.

GEOGRAPHICAL RACES

A LARGE series of this species from Celebes have wings from 175 to 190 mm. in the males. Four specimens from Java have wings up to 196 mm. Australian examples are said by Mathews to reach 206, and even 209 mm., and they have been separated by him on this basis. It seems possible that Javan birds are just as large as those from Australia, and that specimens from Celebes are the smallest of all.

ANAS GIBBERIFRONS GIBBERIFRONS S. MÜLLER

CHARACTERS: Size small; wing 165–190 mm.

RANGE: Celebes.

ANAS GIBBERIFRONS MATHEWSI, NOM. NOV.

Nettion castaneum rogersi Mathews, Austral Avian Record, vol. 1, p. 86, 1912.
Virago castanea rogersi Mathews, List Birds Australia, p. 91, 1913.
Virago gibberifrons rogersi Mathews, Birds of Australia, vol. 4, pt. 2, p. 102, 1915.

CHARACTERS: Size large; wing up to 209 mm.

RANGE: Australia and Tasmania.

Note: The term *rogersi* for this race when referred to the genus *Anas*, becomes invalidated by its prior use for a race of *Anas superciliosa*. The name *mathewsi* is therefore proposed in its stead.

CAPE TEAL

ANAS CAPENSIS GMELIN

(Plate 35)

SYNONYMY

Anas capensis Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 2, p. 527, 1788.

Mareca capensis Stephens, General Zool., vol. 12, pt. 2, p. 139, 1824.

Chauliodus capensis Swainson, Journ. Royal Inst. Gt. Britain, vol. 2, p. 19, 1831.

Anas larvata Lesson, Traité d'Ornith., p. 634, 1831 (*nomen nudum*); Pucheran, Rev. et Mag. de Zool., ser. 2, vol. 2, p. 549, 1850 (descr.).

Querquedula capensis Smith, Cat. South African Mus., p. 37, 1837.

Pœcilonetta georgica G. R. Gray (*nec* Gmelin), List Birds British Mus., pt. 3, p. 134, 1844.

Anas assimilis Forster, Descriptiones Animalium, p. 46, 1844.

Chaulelasmus strepera, a. *capensis* Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.

Querquedula larvata Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.

Nettion capense Salvadori, Cat. Birds British Mus., vol. 27, p. 259, 1895.

VERNACULAR NAMES

English: Cape Teal, Cape Widgeon, African Pink-billed Teal.

German: Kapische Ente.

Dutch: Teal-Eendje, Bruine-Eend, Kaapse Smee-Eend.

Arabic: Boro.

DESCRIPTION

ADULT MALE: Head and neck whitish, dotted and streaked with blackish. Chin and throat nearly immaculate white. Mantle mottled black, white, and buff color. Scapulars dark brown edged with light gray or reddish brown. Back and rump grayish brown; tail gray, edged with whitish. Breast whitish with light-brown spots or bars. Flanks like the breast, but the spots larger. Rest of lower surface nearly white with indistinct spots of dull brown. Under tail-coverts barred with irregular brown spots. Wing-coverts dark gray, except the last row which carry a broad white anterior speculum band. Speculum glossy green in its center, but black on outer and inner border, and also posteriorly. The outer secondaries are pure white, and the tips of all are white, forming a broad white posterior speculum band. Primaries dark brown. Tertials brownish to grayish with lighter edges. Under wing-coverts brown, axillars nearly white, with the shaft of the feather black.

Iris from light hazel to deep orange. According to Littledale the bill is a deep waxen semi-transparent pink with the base and edge of the upper mandible black, and an indistinct streak of turquoise extending from the base about two-thirds of the length of the culmen. H. A. Bryden (1893) gives the bill as "reddish-pink," and Davies calls it a delicate waxy pink. Feet ochraceous fuscous.

Wing 185–200 mm.; bill 38–40; tarsus 33–39.

Adult Female: Similar to the male, but the spotting on the lower side not so well marked. The whole plumage is somewhat lighter in tone.

Size smaller. Wing 190 mm.; bill 38; tarsus 36.

Immature Specimens: Like adults in a general way, but the lower parts are streaked with poorly defined light-brown markings instead of having the barred appearance of later life. The mantle, scapulars and rump are duller in appearance and lack the sharply contrasted markings of adult plumage. The tail-feathers are blunt at the tips (British Museum specimens).

Young in Down: White in general color. Top of head, back of neck, cheeks, back and wings, abdomen and upper tail-coverts grayish brown. A line through the eye and down the neck, another line from the wings to the base of the tail white. Down of the wings, the tip of the tail, and the soft parts (?) somewhat rusty yellowish. Iris grayish white. Bill and feet bluish black (Sjöstedt, 1910).

DISTRIBUTION

The Cape Teal is not a common bird, though it has a large range in Africa, which is being constantly extended by scientific exploration. Like most tropical ducks it is not migratory in the accepted sense of that term, though it moves about locally in response to seasonal conditions of rainfall.

In the north its range extends as far as southern Abyssinia, where it has been taken on Lakes Haddo and Cialalaka (Salvadori, 1884), at Adda Galla (Giglioli, 1888), Lake Toki (Ogilvie-Grant and Reid, 1901) and at Hora Schale (Neumann, 1904). Collectors in this region have none of them found it common.

Farther south it seems to be confined chiefly to the regions of the great lakes and the highlands. It is found in Uganda about Lake Nakuru (Hartert, 1900) and in British East Africa is said by V. G. L. van Someren (1916) to be common on Lake Naivasha. It is a pretty common bird and breeds throughout the Masai country, about the Merker Lakes and Mt. Meru (Schillings, 1905); and is described by Sjöstedt (1910) as quite common, especially in November, on the Natron Lakes in the Kilimandjaro region, where it breeds. Neumann (1898) has recorded it from Lake Manjara, and Böhm (1885) seems to have taken a specimen near Uniamuesi on Lake Tanganyika. West of the great lakes the species has been found in the eastern Congo, at Rutshuru, north of Lake Albert Edward, in August (Lönnberg, 1917), and in the Katanga region (southeastern Congo) in November (Mouritz, 1914). Shelley (1901) has recorded a specimen taken at Mbara in the Nyassa country (British Central Africa).

So far the species has not been recorded from Rhodesia, but Bryden (1893) found it on the Botletle River (northern Bechuanaland) and T. Ayres (1869) saw a few in the Transvaal. It has not been recorded from Natal although C. G. Davies (1911) took one in East Griqualand, and C. H. T. Whitehead (1903) found it on the Orange River near Aliwal North. Littledale (1908) says it is fairly common and breeds on Van Wijks Vlei near Carnarvon. Layard (1875–84) has recorded it from Beaufort West, Knyona and Vogel Vlei in Paarl, and the Novara Expedition met with it at Simons Town (*fide* Stark and Sclater, 1906).

In Damaraland and Great Namaqualand, the Cape Teal is rather scarce, being most commonly seen about Walfisch Bay. Fleck (*fide* Reichenow, 1900) has recorded it from Rehoboth in the interior. Barboza de Bocage (1877–81) states that it is rarer on the coast south of Cunene, but that it was found on the coast of Mossamedes and on the Rio Coroco (Angola). How far north its range extends in West Africa I am not prepared to say. According to B. Alexander (1907) the species was seen occasionally on Lake Chad (!) during his stay there, and de Rochebrune (1883–85), whose statements cannot be accepted unless confirmed by other observations, says it appears pretty regularly in lower Senegambia! He gives various localities where, he alleges, it has been taken.

CAPE TEAL

GENERAL HABITS

HAUNTS. This is one of the African ducks that has been least written about. Besides being everywhere an uncommon species, it has been often confused with the African Red-bill (*Anas erythrorhyncha*), from which it is distinguished with difficulty in the field.

It seems to be a bird that frequents larger lakes rather than small water-holes or marshes. Neumann (1898) and also Littledale (1908) noted its partiality for salt-water lakes which other species were not so particular about.

WARINESS. From Littledale's (1908) account one would conclude that this is a very confiding bird during the nesting season. He says, however, that it is sometimes very shy, excepting at dusk, when it becomes tame.

DAILY MOVEMENTS. Littledale says that in the evening they sometimes flight, but this habit is, during the breeding season at least, of somewhat irregular occurrence, not taking place every night. A pair which he observed spent the day in the middle of a large salt-pan.

SWIMMING, DIVING. Mouritz (1914) mentions a bird which submerged at his approach, instead of flying away!

FLIGHT. Large flocks are apparently very rare, but Sjöstedt (1910) noted some flocks, both large and small, on the Natron Lakes (Kilimandjaro lowlands).

In the field it can be told from the Red-billed Teal (*Anas erythrorhyncha*) by the large amount of white showing in the wing.

ASSOCIATION WITH OTHER SPECIES. Layard (1875-84) says he met it in company of the Red-bill in Cape Colony.

VOICE. The only information regarding the note is that given by Littledale (1908) who says there are two different calls: one a *quack* uttered when on the wing, the other a "sort of short whistling note." He does not distinguish the notes of the two sexes, but doubtless the whistle is the note of the male, the *quack* that of the female.

FOOD. There is no adequate description of the food habits. In southern Abyssinia they were found feeding on small crustaceans (Neumann, 1904) and on grass or aquatic insects (Salvadori, 1884).

COURTSHIP AND NESTING. In the northern part of its range the breeding season, so far as can be judged by the very scant information, is irregular, extending from June in the Masai region (full-grown young in July — Schillings, 1905) to March

in the Kilimandjaro district (young in down March 17 — Sjöstedt, 1910). At Nakuru Lake, East Africa, a female in October had greatly enlarged ovaries (V. G. L. van Someren, 1922).

In South Africa eggs were found in July and both eggs and young in August near Carnarvon, Cape Colony. For the only good account of the nesting habits we are indebted to Littledale (1908). He describes three nests, undoubtedly belonging to this Teal. Two of these were placed under very thin and scanty bushes which did not conceal them from view. The third was well hidden under a thick bush. The nest depressions were nine inches in diameter, and three inches deep, the bottoms almost bare and the sides encircled with down. Once when he frightened a female off the nest, she returned over the nest as though she wanted to cover the eggs before leaving, although the observer was in a boat twenty yards away at the time. One of the nests which he found on an island in Van Wijks Vlei was evidently placed on the site of an old nest of an Egyptian Goose. It contained one old egg belonging to that species, lying among the nine eggs of the Cape Teal. On subsequent visits to the island the mother Teal left her nest a few minutes after the observer's arrival, and on each occasion the eggs were carefully covered over with down.

From Littledale's notes it is evident that the drake stays in the neighborhood of the nest, for he says he never found a hen bird alone. The number of eggs seems to vary from seven to nine, and the incubation period as nearly as he could estimate it, was twenty-one days, possibly more.

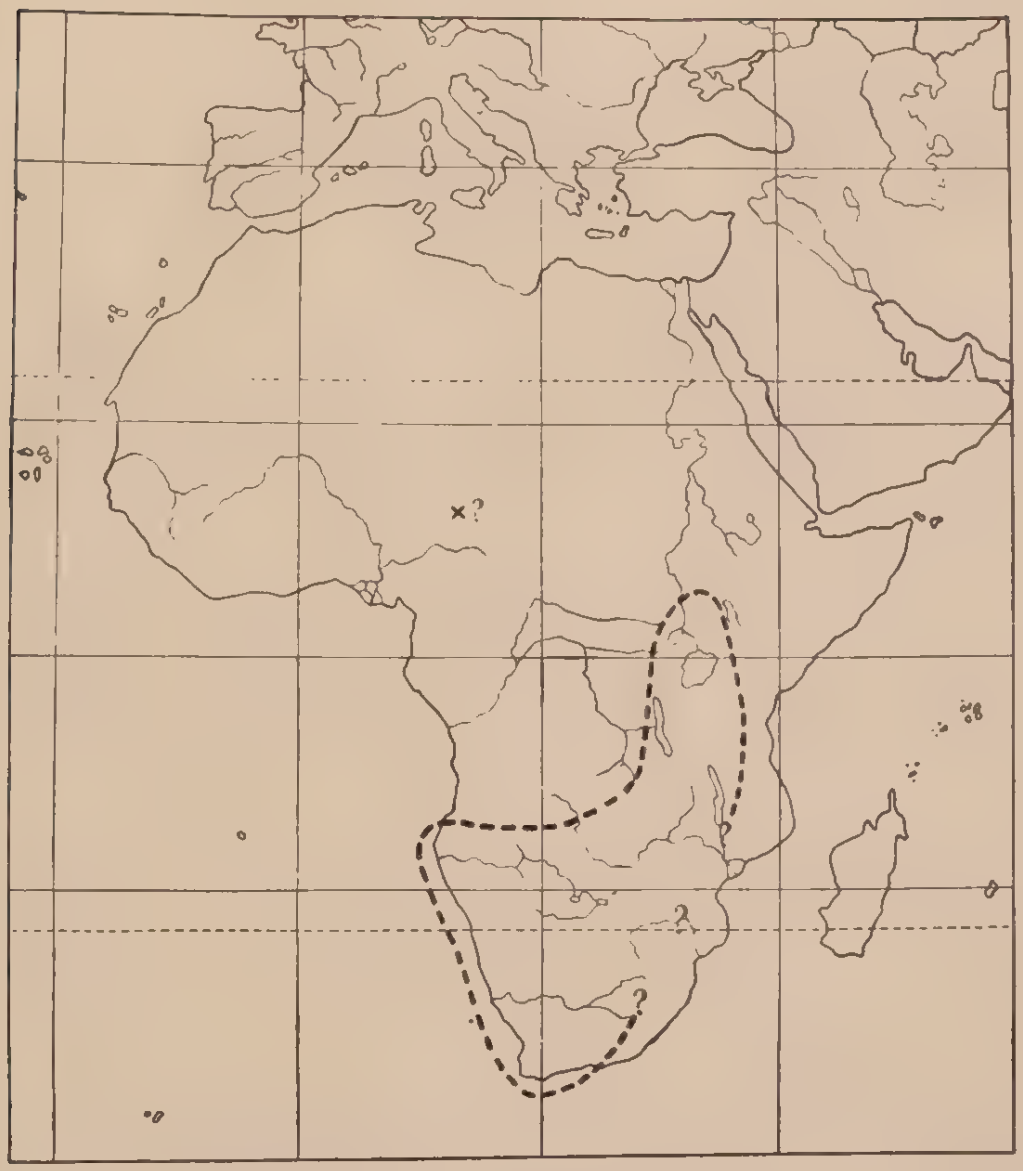
The eggs are yellowish-white in color and measure 37 by 48 mm. (Sjöstedt, 1910), or sometimes up to 54 mm. in length (Nehrkorn, *fide* Reichenow, 1900).

Status. Reference to the Distribution will show the general scarcity of this bird over almost the whole of its range. On the Natron Lakes, Kilimandjaro lowlands, although comparatively well represented, it was less numerous than the Red-bill, Cape Shoveller or South African Pochard (Sjöstedt, 1910). For some reason museum specimens have always been exceedingly rare in American collections.

Dr. A. K. Haagner, Director of the National Zoological Gardens at Pretoria, writes me under date of September, 1922, that the game-laws of South Africa are now framed in such a way as to give ducks a good chance in the breeding season. He adds that the lakes are not being drained but that the *vleis* are drying up. Whether or not this is the direct result of intensive agriculture, as seems the case in our own West, I do not know.

Food Value. Littledale says the Cape Teal is very good eating but not so good as the Red-bill (*Anas erythrorhyncha*).

Behavior in Captivity. This species seems never to have been imported alive into Europe or America.



MAP 50. Distribution of Cape Teal (*Anas capensis*)
Questionable sporadic record indicated by cross (×?)

MADAGASCAN TEAL

ANAS BERNIERI (HARTLAUB)

(Plate 36)

SYNONYMY

Querquedula bernieri Hartlaub (*ex* J. Verreaux, MS.), Journ. f. Ornith., vol. 8, p. 173, 1860.

Anas bernieri Vinson, in Dupré, Trois mois à Madagascar, p. 262, 1863.

Anas assimilis Schlegel, Mus. d' Hist. Nat. des Pays-Bas, Anseres, p. 59, 1866 (part)

Dafila vinsoni Grandidier, Rev. et Mag. de Zool., ser. 2, vol. 19, pp. 87, 255, 1867.

Dafila bernieri Grandidier, Rev. et Mag. de Zool., ser. 2, vol. 19, p. 255, 1867.

Querquedula gibberifrons Grandidier (*nec* S. Müller), Rev. et Mag. de Zool., ser. 2, vol. 20, p. 6, 1868.

Anas gibberifrons Schlegel and Pollen (*nec* S. Müller), Recherches Faun. Madag., Oiseaux, p. 160, 1868.

Anas capensis G. R. Gray, Hand-list Birds, vol. 3, p. 82, 1871 (part).

Anas gibberifrons, var. *bernieri* Milne-Edwards and Grandidier, Hist. Nat. des Oiseaux de Madagascar, p. 726, pls. 270, 271, 271a, 275, fig. 3, 1876–81.

VERNACULAR NAMES

English: Bernier's Duck, Madagascan Teal.

German: Bernier's Ente.

French: Le canard de Bernier, Sarcelle de Madagascar.

Madagascan: (local) Haké.

DESCRIPTION

ADULT MALE AND FEMALE: Very closely resemble the Gray Teal of Australia (*Anas gibberifrons*) but the speculum is velvety black with no green in it. The head is almost exactly as in the Gray Teal except that the chin and throat are buff-colored, not white. Upper surface very like the Gray Teal but the edges of the feathers are not so light in color. The lower surface is not so strongly mottled and the blackish spots are much more obscure. The anterior white wing-bar is very broad and the black speculum is formed by the secondaries, which have a narrow white band at their tips. The axillars are pure white instead of brown (four specimens in Leyden Museum). Salvadori says the upper wing-coverts are more gray than in *Anas gibberifrons*.

The iris is brown; the bill reddish brown to red and the feet red to brown (Grandidier; Tring Museum).

I doubt whether the soft parts have been accurately rendered in my plate of this Teal.

Wing 203 mm.; culmen 38; tarsus 38.

DISTRIBUTION

This species is confined to Madagascar, where it is said to be not uncommon, though occurring much more frequently on the west than on the east coast (Hartlaub, 1877; Milne-Edwards and Grandidier, 1876–81).

GENERAL

Nothing much is known of the life-history of this apparently rare bird. It is found either along the great water-courses, or on the marshes and small morasses. Usually it is seen in small companies (Milne-Edwards and Grandidier, 1876–81). Sganzin (1840) says it stays on streams and is met with throughout the year in company with gallinules. He considered it easy to shoot, and speaks of the flesh as similar to that of "European Wild Ducks" (Mallards?) in taste.

It is quite remarkable that Mr. F. R. Wulsin, who collected for the Museum of Comparative Zoölogy between June and September, 1915, both on and near the southwest coast and near the east coast of Madagascar, did not meet with this Teal at all. None of the large museums in this country has specimens, and so far as I know it has never been introduced alive into collections of water-fowl in either Europe or America. European museums also lack good series, judging from the very small number I saw at Leyden, at Tring and in the British Museum (Natural History). It seems to me, therefore, that the bird must be either very local or else rather rare.

MADAGASCAN TEAL

YELLOW-BILLED TEAL

ANAS FLAVIROSTRIS VIEILLOT

(Plate 37)

SYNONYMY

Anas flavirostris Vieillot, Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 107, 1816.
Anas creccoides King, Zool. Journ., vol. 4, p. 99, 1828.
Querquedula creccoides Eyton, Monograph Anatidæ, p. 128, 1838.
Anas a ara Merrem in Ersch and Grube's Encyclop., sect. 1, vol. 35, p. 26, 1841.
Querquedula oxyptera Hartlaub (*nec* Meyen), Naumannia, 1853, p. 217.
Querquedula flavirostris P. L. Sclater, Proc. Zool. Soc. London, 1867, p. 335 (part).
Nettion flavirostris G. R. Gray, Hand-list Birds, vol. 3, p. 83, 1871.
Nettion flavirostre Salvadori, Cat. Birds British Mus., vol. 27, p. 261, 1895.

VERNACULAR NAMES

English: Yellow-billed Teal, Chilian Teal, Tree Teal.

German: Chilenische Krickente.

Spanish: Pato chico, Pato jergon chico, Patito, Pato barcino chico, Assobiadeira.

DESCRIPTION

ADULT MALE: Head and neck gray, thickly and finely barred with black. Mantle gray. Scapulars with black centers and light edges. Back, rump, upper tail-coverts and tail, gray-brown. Lower parts silvery white to light gray, the feathers having round black spots on the breast and upper abdomen, and indistinct black bars and spots on the lower abdomen. Under tail-coverts brownish to gray. Outer wing-coverts uniform gray except the greater ones which have a band of cinnamon on their tips. Speculum velvety black except the inner edge, which is metallic green. There is a broad buffy band at the tip of the secondaries, forming a posterior speculum-band. Primaries dark gray. Tertials like the primaries. Under wing-coverts gray and white, axillars white.

Iris brown. Bill yellow with a black nail. Feet grayish.

Wing 192–202 mm.; bill 35; tarsus 37.

ADULT FEMALE: Like the male, but the round spots on the breast are not so prominent, and the tertials are not so black in their centers. Size smaller; bill not so bright colored.

Wing 185–197 mm.; bill 30–35; tarsus 35.

YOUNG IN FIRST (JUVENAL) PLUMAGE: The pileum is blacker, and the lower parts, especially the breast, are not so distinctly spotted. There is less of the silvery sheen to the lower surface. The whole upper surface is inclined to be darker and browner, with light edgings of the feathers brown, rather than gray.

Young with some down still adherent and primaries not yet started are very like the last but lower parts almost unspotted except on upper breast.

YOUNG IN DOWN: Very similar to many other ducks, but there is a broad black face-patch along the center of the cheeks, with a light stripe between it and the eye. There is a narrower black stripe through the eye and a superciliary brownish streak. At the base of the culmen a round brownish spot. Top of head coal black. Upper side very dark brown with the usual white areas on scapulars, wing-rudiments and sides of rump. Lower side silvery white to yellowish, with suggestions of a gray band across the upper breast.

DISTRIBUTION

THE Yellow-billed Teal is a fairly common bird in southern South America, and like so many ducks in that region, appears to be essentially non-migratory. In the northernmost part the range meets or coincides with the southern part of the range of *Anas oxyptera*, and it may be that some of the records for this district are confused.

Argentina

The present species is recorded as occurring throughout Argentina. It has been met with in the northernmost Province, Jujuy, near Moreno (Lönnberg, 1903) and near Carahuasi in eastern Salta (Borelli, *fide* Dabbene, 1910). Lillo (1902) has recorded it for Tucuman, and Giacomelli (1907) for Rioja. It has been found breeding in Cordoba (E. W. White, 1883; Frenzel, 1891) and is said to be common near Mendoza (H. Burmeister, 1860; Reed, 1916).

Uruguay

Brazil

Eastward it is probably less common in the Chaco. It does not occur in Paraguay, but is said to be common on the lower Uruguay (Barrows, 1884) and it has been found in southeastern Brazil in the Province of Rio Grande do Sul (von Berlepsch and von Ihering, 1885; H. and R. von Ihering, 1907) and is the commonest Teal in Uruguay (Aplin, 1894; Tremoleras, 1920).

Patagonia

Returning to the Argentine, I note that the species is common in the Province of Buenos Aires, where it breeds to some extent (A. H. Holland, 1892; C. H. B. Grant, 1911; Durnford, 1878; Hartert and Venturi, 1909; E. Gibson, 1920). It is even more abundant, especially as a breeding bird, in Patagonia, and has been so recorded for the region of the Rio Negro and Rio Colorado (Doering, 1881) and for Chubut (Durnford, 1878; Gerling, *fide* Dabbene, 1910). Mr. J. L. Peters, who has recently been collecting for me in western Patagonia (Gobernación del Rio Negro) says the species was a not too common resident in the localities he visited, but Scott and Sharpe (1912) say it is common in Patagonia.

Straits of Magellan

It must be an abundant bird in the Straits of Magellan, judging by the number of records available. Vinciguerra (*fide* Dabbene, 1910) found it nesting on the Island of Estados, and others have recorded it for Punta Arenas (Schalow, 1898; Salvadori, 1900; Brewster-Sanford collection), Penguin Rookery (Salvadori, 1900), Port Gallant and Cockle Cove (R. B. Sharpe, 1881) and Port Famine (Ridgway, 1890).

In Tierra del Fuego the species is migratory, and it seems to be a common enough breeder (Crawshay, 1907; Blaauw, 1916a). In the Falklands it is a common bird and has been found nesting (P. L. Sclater, 1860b; Abbott, 1861; Oustalet, 1891; W. S. Brooks, 1917).

Chile

What its status in Chile may be I do not know. L. Fraser (1843), Gay (1847), Philippi (1868), James (1892) and Quijada (1910) all include it in their lists and some state that it is common, or generally distributed. The only specific records or localities I have been able to find are these: Blaauw (1916a) saw flocks on Lago Todos los Santos; Hartlaub (1853) records it for the Rio de Valdivia, and von Bibra (1855) says he found it common on all the lakes about Santiago. Lane (1897) does not seem to have found it in northern Chile, where it is no doubt replaced by *Anas oxyptera*.

GENERAL HABITS

There are several curious traits in this bird which make it rather noteworthy. It is the most Teal-like of the South American ducks, although in its appearance

MAP 51. Distribution of Yellow-billed Teal (*Anas flavirostris*)

and habits there is little to remind one of the Common Teal. When first seen in the field Mr. J. L. Peters (MS.) found it easy to confuse with the Brown Pintail. On the water it appears as a small dark-colored duck with prominent yellow bill, while on the wing it may be distinguished by its small size, short neck and "knoblike" head.

HAUNTS. It frequents various types of country, both inland and coastal, and in Tierra del Fuego, Crawshay (1907) found it at low tide lurking in the pools among the rocks. The mouths of streams, no matter how small, were favorite haunts. In Hudson's day it was to be found on every marsh, stream and pool on the pampas. He characterized it as rapid in flight, restless, lively, and extremely pugnacious (P. L. Sclater and Hudson, 1889).

WARINESS. It seems to be generally regarded as the tamest duck in the Argentine and the same holds true of the Falklands (Abbott, 1861; Crawshay, 1907). Speaking of the remarkable colony that nests with the parrots on his ranch near Cape San Antonio, E. Gibson (1920) says that they often occupy sites overhanging the principal paths, or in the immediate vicinity of the dwelling-house. They seem even to prefer these situations, he continues, "and it is at their own convenience and not from any movement of passersby that the birds leave their perch in the morning. . . . I have recorded more than one instance, when, on their return in the evening, a pair or more have passed low down over the heads of the tennis players, or through the *patio* itself, quite members of the community."

DAILY MOVEMENTS. The Teal in the tree-nesting colony on Mr. Gibson's place leave their perches in the morning, sometimes considerably after sunrise, and go off to their feeding grounds. This habit is perhaps characteristic only of birds in a perfectly unmolested region.

SWIMMING, DIVING, PERCHING. So far as known this Teal never dives, but it perches freely, both during and after the breeding season. A colony that Dr. Wetmore saw, and of which he has written me, spent much time perching in the lofty branches of the eucalyptus trees, sometimes fifty feet high. C. H. B. Grant (1911) says they are usually seen in trees when not on the water.

FLIGHT. The flight is swift and agile, the birds twisting much when threading their way through the trees (C. H. B. Grant, 1911). In regard to flocks, Mr. Peters (MS.) found them in Rio Negro Province in small companies. P. L. Sclater and Hudson (1889) speak of flocks of twelve to twenty as the usual number.

ASSOCIATION WITH OTHER SPECIES. Though sometimes found in separate flocks they are at other times seen mixed with flocks of Gray and Cinnamon Teal, while any flocks of non-breeding ducks are apt to contain a few of this species (Peters, MS.).

Its remarkable habit of sharing the nests of the Green Parakeet will be discussed in connection with Courtship and Nesting. There is an instance on record of a Common Partridge (*Nothura maculosa*) and a Yellow-billed Teal laying each a full complement of eggs in the same nest, which was located in a thistle bush at some distance from the water (Hudson, 1874, p. 167).

Voice. In general the notes are Teal-like, the female having a harsh scraping *quack* continually repeated while on the wing (C. H. B. Grant, 1911). The males are very silent and Mr. Peters while traveling in Rio Negro was unable to determine the note. Hudson, however, was familiar with it, and described it as a clear whistling note in the love-season (P. L. Sclater and Hudson, 1889).

Food. Four stomachs collected by J. L. Peters in Rio Negro Province between August and January, 1920, and analyzed by the U.S. Bureau of Biological Survey, showed vegetable matter from 64 to 98%. This consisted of the seeds of *Scirpus americanus*, *Carex*, *Myriophyllum* and *Rumex* (rush, sedge, water milfoil, dock) besides much vegetable débris and several kinds of unidentified seeds. One stomach held 250 seeds of *Scirpus* and 130 of *Carex*. Animal matter was abundant in one stomach only. It consisted of the remains of amphipods, caddis-cases and larvæ, traces of ceratopogonid larvæ and possibly the larvæ of other insects.

Courtship and Nesting. In the Falkland Islands the nesting season is in September and October (Abbott, 1861; W. S. Brooks, 1917). In Tierra del Fuego they arrive in late September or early October (Crawshay, 1907) and probably nest in October. The same applies to the Straits (R. M. Beck, MS.). In northwestern Patagonia a pair, undoubtedly nesting, was noted in late September and early October (Peters, MS.). All over the northern part of its range the nesting season is far more irregular, depending largely upon the rainfall. The first eggs taken near Cape San Antonio were found on August 26, and there it is classed among the early nesting species (E. Gibson, 1920). In the Province of Cordoba also it nests in August and September (E. W. White, 1883).

The only account of the display that I know of is that of Wormald (1914). His captive birds displayed throughout the whole year, even when they dropped their flight-feathers in July. The display attitude is rather unusual: the male "slowly raises his breast out of the water, with head drawn back between his shoulders, and then gradually raises himself out of the water, until one feels that he will fall over backwards. During this performance he utters a loud and very melodious whistle." This curious posture is figured by Wormald.

Certainly over most of its range this Teal nests on the ground, and many observers have either failed to find the nest or have remarked how carefully it was hidden and

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YELLOW-BILLED TEAL

SHARP-WINGED TEAL

ANDEAN TEAL

how difficult to find. Abbott (1861) says it is harder to find than the nest of any other bird he knows. No nests were found by Aplin (1894), Crawshay (1907), W. S. Brooks (1917) or Peters (MS.).

Unusual nesting sites were holes in the clay banks of rivers, found by E. W. White (1883) in the Province of Cordoba. Perhaps the most remarkable habit ever ascribed to a duck has developed in this species in a restricted part of its range (Province of Buenos Aires). At Mr. Gibson's residence near Cape San Antonio they have taken to nesting in the curious community dwellings of the Green Parakeet (*Myopsittacus monachus*). These remarkable Parakeet nests, which were at first placed in the low *tala* trees, but of late years have been built in the loftiest eucalyptus, an introduced tree of course, are well described by E. Gibson (1880): "The nests are generally suspended from the extremities of branches, to which they are firmly built or woven in. The new nests consist only of two chambers, the porch and nest proper, and are built and inhabited by a single pair of birds. These become gradually added to, till plenty of them come to weigh perhaps a quarter of a ton each, and are of a bulk enough to fill a large cart. Thorny *tala* twigs (no branches), firmly interlaced, form the only material; and there is no lining to the chambers, even in the breeding-season. Some old forest trees have seven or eight of these huge masses suspended to their branches, while the ground underneath is strewn with twigs and the remains of fallen nests. The entrance to the chambers is almost invariably underneath, or, if on the side, is protected by the overhanging eave, doubtless in both cases as a safeguard against attacks of the opossum (*Didelphys aurita*)." The entrances lead into a porch or outer chamber; there is never any communication between the apartments of different pairs. The larger nests have accommodations for about a dozen pairs.

The Teal sometimes lay in these nests when deserted, but in certain cases they lay their eggs in occupied chambers. It seems to make little difference to the Teal, for in such cases the Parakeet usually abandons the nest, whereupon the Teal is said to break the Parakeet's eggs, push them away, and incubate her own (Dabbene, 1918).

Another nest location in the eucalyptus woods, first noted by E. Gibson (1920) in 1913 was on the top of an accumulation of bark and leaves in a bifurcation of the trunk ten or fifteen feet from the ground. The relation between the parrots and the Teal in these situations is not entirely clear. The Green Parakeet is said to be a very bellicose bird, yet it seems to abandon its nest when the Teal occupies it. Neither E. Gibson (1920) nor C. H. B. Grant (1911) says anything about the Teal breaking the parrot's eggs, and this practice, mentioned only by Dabbene (1918) is certainly very unusual for a duck, or any other bird for that matter. Dabbene's information seemed to be based solely on the observations of a collector named Rodriguez, and I should like to see these facts further verified. The third occupant of these strange colonies is sometimes the opossum, but whether he really destroys many eggs of the

parrot and Teal is not apparent. These Parakeets have always been killed for food and by this time large colonies of them must be very uncommon (Barrows, 1884).

The Yellow-bill's clutch is unusually small for a duck, averaging about five eggs, both when the nest is on the ground and when in trees. E. Gibson (1920), however, says he has found as many as eight or nine in the Parakeet's nest. This may have been the work of two birds. The eggs are of a pale cream-color, measuring 51 54 by 37–39 mm. The incubation period is not known. Some of Mr. Wormald's captive-laid eggs hatched in twenty-six days, but this seems rather long for so small a duck.

STATUS. This Teal is one of the common Argentine ducks, but is everywhere greatly exceeded in numbers by the Brown Pintail, and in the west by the Chiloë Widgeon. Aplin (1894) says it is the commonest Teal in Uruguay, but in northwestern Patagonia, where it is not a particularly common resident, it was fourth or fifth in order of abundance among the ducks, representing only about 1% or 2% of the total. Its status in those parts seemed to be about the same as that of the Argentine Gray Teal, the Cinnamon Teal and the South American Shoveller (Peters, MS.).

ENEMIES. The possible enemies of ducks in Patagonia have already been discussed in the account of the Chilian Widgeon. The water-fowl in those regions seem to be particularly free from attacks by predatory beasts and birds.

FOOD VALUE. This is evidently an excellent bird for the table.

BEHAVIOR IN CAPTIVITY. This Teal does not seem to have been imported into Europe till 1871, when the London Gardens procured some. So far as I know the species has never bred in London, and it cannot be classed as a bird which lends itself easily to propagation under artificial conditions. It has been often kept, but seldom bred. Among English amateurs Mr. Hugh Wormald (*in litt.*), Earl Grey of Falloden (*in litt.*) and Mr. W. H. St. Quintin have been successful. A pair of birds on the latter's ponds raised their own young in 1918, but these all escaped (London Field, vol. 133, p. 12, 1919). In this country, so Mr. L. S. Crandall informs me, the species has been bred by Mr. John A. Cox at East Brewster, Massachusetts.

They do fairly well in captivity. Eight specimens in the London Gardens lived an average of two years, eleven months, the maximum being seven years and three months (P. C. Mitchell, 1911). One specimen received in April, 1912, in the New York Gardens, died nearly nine years later (Crandall, *in litt.*).

HYBRIDS. The only cross of which I know was one between this species and the Mallard, produced in the London Gardens (Salvadori, 1895).

SHARP-WINGED TEAL

ANAS OXYPTERA MEYEN

(Plate 37)

SYNONYMY

Anas oxyptera Meyen, Nova Acta Acad. Leop.-Carol., vol. 16, suppl., p. 121, 1833.
Querquedula creccoides G. R. Gray, List Birds British Mus., p. 138, 1844.
Querquedula oxyptera Tschudi, Fauna Peruana, Aves, pp. 55, 309, 1844–46.
Dafila oxyptera Reichenbach, Synopsis Avium, Natatores, pl. 92, fig. 164, 1845.
Querquedula angustirostris Philippi and Landbeck, Anales Univ. Chile, Santiago, vol. 21, p. 439, 1862.
Nettion oxypterum Salvadori, Cat. Birds British Mus., vol. 27, p. 262, 1895.

VERNACULAR NAMES

English: Sharp-winged Teal.
Indian: Paspa chica.

DESCRIPTION

ADULT MALE: Similar to *Anas flavirostris* but larger; mantle and scapulars more brownish and less gray, with the black areas reduced in size. On the lower surface the dark spots are smaller, more brownish and confined to the breast, leaving the abdomen and under tail-coverts nearly immaculate pale gray, although the latter may have a buffy tinge.

Iris brown. Bill yellow with a black central stripe. Legs and feet grayish.

Wing 204–225 mm.; bill 33–36; tarsus 37.

ADULT FEMALE: The plumage appears to be the same as in the male and is not even duller. I have found very little difference in the size of the sexes. A series of females from Lake Junin and Lake Titicaca have wings from 192 to 215 mm. — only 10 mm. less than in the males.

IMMATURE PLUMAGES: Not available.

YOUNG IN DOWN: Two specimens collected at Lake Titicaca, Peru, are remarkably different from the young of *Anas flavirostris*. The white of the under parts extends higher on the sides, particularly on the sides of the breast. The color of the upper side is paler, and the white wing-, scapular- and rump-spots are more prominent. The dark face-mark is present, but not so prominent, while the light face-stripes are correspondingly accentuated. The difference between the young of this and the last species is interesting, and rather surprising.

DISTRIBUTION

THE Sharp-winged Teal is a species closely allied to the preceding, and is found in the Andean regions of southern Peru, western Bolivia, northern Chile and northern Argentina. In Peru the range extends as far north as Lake Junin (Taczanowski, 1886; Brewster-Sanford collection), but it seems to be

more common in the south, especially about Lake Titicaca and in Arequipa (J. A. Allen, 1875; Taczanowski, 1886; Brewster-Sanford collection; Menegaux, 1909a; von Berlepsch and Stolzmann, 1906). P. L. Sclater and Salvin (1869a) have also recorded it from Tungasuca and the vicinity of Tinta, and F. M. Chapman (1921) reports a specimen in the Occobamba Pass, not far from Cuzco.

In western Bolivia the species has so far been found chiefly in the vicinity of Lake Poopo. Menegaux (1909a) has recorded it from Tamarape, Sicasica and Pazna Bastide.

In northern Chile, so far as I know, the species has been found only in the Provinces of Tacna and Tarapaca. The dividing line between *Anas oxyptera* and *Anas flavirostris* in this region is not yet clear. Taczanowski (1886) has recorded it from Tacna and the vicinity of Cutervo, and P. L. Sclater (1886) says it was taken by Berkeley James at Sitana, Huasco, Sacaya and Lalcalhuay in the Province of Tarapaca. It has also been taken at Calalaste, Tarapaca (Philippi, 1888) but Lane (1897) found it not common near Sacaya.

From the Argentine the species has been recorded for the northernmost Provinces only, Jujuy and Salta (Bruch, 1904), but I strongly suspect that some of the records for *Anas flavirostris* from this region should be referred to this species.

GENERAL HABITS

THIS duck is very similar to the preceding species (*Anas flavirostris*) in appearance, although the difference in the downy young is very striking. This is a remarkable fact, if the distinction always holds as well as it does in the few specimens I have seen.

The present species is confined to high Andean plateaus, reaching altitudes of at least 13,000 feet in Peru. Practically nothing has been recorded concerning its habits, breeding, voice, status, etc. Young have been obtained at Lake Titicaca in February (J. A. Allen, 1875). A large series taken by R. M. Beck at Lake Junin in March and April, 1913, and at Lake Titicaca in August (Brewster-Sanford collection) shows the following peculiarities: of eleven males from Lake Junin several had moulted the primaries; the sex organs of these males were either small or medium-sized, and none of them was in a breeding condition. One male taken at Lake Titicaca, August 18, was breeding. Of the seven female specimens, those taken in March had the sex organs either small or beginning to swell, while in one the ovaries were large. In a female specimen taken at Lake Titicaca on July 26, the sex organs were swelling. The breeding season therefore seems to be very irregular in that even climate.

Map 52. Distribution of Sharp-winged Teal (*Anas oxyptera*)

SOUTH GEORGIAN TEAL

ANAS GEORGICA GMELIN

(Plate 37)

SYNONYMY

Anas georgica Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 2, p. 516, 1788.

Tadorna georgica Stephens, General Zool., vol. 12, pt. 2, p. 76, 1824.

Anas xanthorhyncha Forster, Icones Inedit., pl. 71; Descriptiones Animalium, p. 342 (*nec* p. 45), 1844.

Querquedula xanthorhyncha Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.

Querquedula eatoni Cabanis (*nec* Sharpe), Journ. f. Ornith., vol. 32, p. 254, 1884.

Querquedula antartica Cabanis (*sic*), Journ. f. Ornith., vol. 36, p. 118, pl. 1, 1888.

VERNACULAR NAMES

English: South Georgian Teal, Georgian Duck.

DESCRIPTION

ADULT MALE: Very similar to *Anas flavirostris* but there is no iridescent green band on the inner side of the speculum although the black part of the speculum may have a greenish cast. The whole lower surface is darker, browner and more uniform. The under tail-coverts are dark brown, with brown edges, and not gray or buff. The mantle is nearly uniform dark brown, and there is no black anywhere except along the inner web of the tertials. The top of the head is browner than in *Anas flavirostris* and streaked longitudinally instead of being barred. The tail is very long and pointed, 120 mm. instead of 90 or 100.

This species also resembles the South American Pintail (*Anas spinicauda*) from which it may be told by its smaller size and the darker color of the lower parts and the mantle. The head is very nearly of the same color as in that species, except that the chin and throat are more thickly spotted. Wing very similar to that of *Anas spinicauda*.

Iris dark brown. Culmen, nail and distal border of maxilla, black; remainder of top of bill slaty blue; side of maxilla Naples yellow, becoming greenish where it blends with the blue tip. Legs and feet olive green mottled with sooty brown (Murphy, 1916).

Wing 217 mm.; bill 34; tarsus 37.

ADULT FEMALE: Distinguishable only by the dull speculum and slightly smaller size (Murphy, 1916).

IMMATURE SPECIMENS: Same general color as adults (Lönnberg, 1906).

YOUNG IN DOWN: Head above and the back of the neck reddish brown; lower part of the back reddish brown from the wing-rudiment to the hip and farther back a yellow stripe. Lower part of body a greenish lemon-yellow, somewhat more brown on upper breast. Iris dark brown, feet and webs olive-grayish green with a light yellow-brown bar. Another description by the same writer (von der

Steinen) means very little more. Unless downy specimens are compared directly with young of the more common surface-feeding ducks, little can be learned. I have not seen a specimen in down myself.

DISTRIBUTION

THE South Georgian Teal is confined to the island of South Georgia (in the South Atlantic), where it is rather common on the northern coasts (Pagenstecher, 1885; von der Steinen, 1890; Lönnberg, 1906; Szielasko, 1907; Murphy, 1916).

GENERAL HABITS

THIS isolated member of the duck tribe, seen by so few naturalists, seems to be most closely related to the Brown Pintail of South America. Our knowledge of its status and habits is due almost entirely to the explorations of von der Steinen, Lönnberg, and more recently the American ornithologist, Robert Cushman Murphy. The last-named writer has called attention to its great resemblance to the Brown Pintail of which it is almost a miniature, except that the Georgian Teal has sixteen tail-feathers against fourteen for the Brown Pintail.

These birds are found on the small lagoons on the seashore, as well as on the ponds of the plateau. They come to the seashore at low tide. Murphy thinks they are probably not found on the southern slope of the island. He found them commonest in the Bay of Islands in the middle of December, where they were feeding about the small islets in the bay, on rocks and kelp-fields, and on the fresh-water ponds in the hollows of the grassy islands.

WARINESS. Before they were disturbed these birds were probably the tamest of all *Anatidæ*. At the Bay of Islands, where they had not been molested, bands of men could walk close up to them, and Murphy himself came within six feet of a pair, which only waddled off among the hummocks, from which refuge they peered out at him through a screen of drooping grass. Von der Steinen and the other members of the South Polar Expedition found them at first not at all suspicious, so that they could be shot while sitting. Gradually they became more wary and in the end were quite difficult to secure. Lönnberg says they are particularly shy in winter, when they live in flocks on the coast.

DAILY MOVEMENTS. Their daily habits depend entirely on the tide, for when not actually breeding, they seem to spend most of their time on the coast, feeding when the tide is out and resting during high water.

GAIT, SWIMMING, DIVING. Before the arrival of white men these Teal probably used their wings only for very short flights. Several observers have noted their habit of running away in the grass rather than flying, when approached. The old

birds do not dive, but the young sometimes resort to this practice as a means of escape (Lönnberg, 1906).

Flight. They are usually seen in flocks of from six to twelve, but in winter they seem to flock together in companies numbering as many as one hundred (von der Steinen, 1890; Lönnberg, 1906).

Voice. The male has a whistling note repeated several times (Lönnberg, 1905; Szielasko, 1907). Another note, probably that of the female, sounds like the bursting of large bubbles. This, says von der Steinen, is usually uttered as a warning cry. While the birds were feeding, Murphy heard an occasional *quack* which was undoubtedly also the female's note.

Food. The principal food seems to be amphipods, gleaned from the kelp-fields and about the rocks at low tide. They also feed in the ponds and in the bare, wet runways between tussock-hummocks, though what sort of food they obtain in these situations is not apparent (Murphy, 1916).

Courtship and Nesting. The breeding season extends from November to late February, but the majority seem to nest in December. Von der Steinen saw them several times in pairs in November, and observed the first mating on November 19. Members of the Expedition found the first eggs on December 8, and the first young on December 18. Sörling found the first eggs on December 7 and met with broods on December 13 and 14 (Lönnberg, 1906). Late nests, however, seem to be quite common. Murphy found a nest on February 28 and von der Steinen found ducklings late in February, and even up to March 15.

The nests found were all very carefully concealed in the high tussock-grass. One discovered by Murphy on February 28 was on top of a hummock, beside a pond, and two hundred yards from the shore of Possession Bay. It was covered by dead standing blades of grass which completely arched it over. The nest was lined with dead grass and a few feathers, and contained five eggs lying with the small ends together in the deep bowl. Five seems to be the usual number of eggs in the clutch, and only one nest is recorded with less than this (nest with three eggs, von der Steinen) and none with more. The small complement seems to be an adaptation to the rigorous climate of South Georgia, and is characteristic of other Antarctic birds, especially terns and other sea-birds.

The eggs are of a cream color, with a highly polished surface. No measurements are published. The nest-down is described as being whitish gray (von der Steinen, 1890).

None of the naturalists who have visited South Georgia has recorded anything

about the behavior of the male after the young are hatched, nor have they said anything about the display.

STATUS. During Murphy's stay in South Georgia (1912–13) he found that this Teal had fared badly, due to the establishment of numerous whaling stations on the island. In the neighborhood of Cumberland Bay it has become so greatly reduced that he saw only six birds. Due, however, to the separation of the bays and fjords by impassable glaciers and ice-capped ranges, the extinction of the species is unlikely for some time to come. Murphy says that although the bird was numerous, he rarely saw more than two dozen in one day. This may perhaps be explained by the fact that he was there mostly in the nesting season. He does not think that this species can be nearly as abundant as is Eaton's Pintail on Kerguelen Island. Szielasko (1907) saw exceptionally large numbers in an unknown bay north of Cumberland Bay.

Both Lönnberg and Murphy have noted the preponderance of males over females.

ENEMIES. It is very hard to understand how a Teal can maintain its existence in the presence of the Great Skua Gull (*Catharacta*). When a parent bird and her brood are surprised, the mother feigns lameness and the young disappear as if by magic in the tussock-grass (Murphy, 1916). Once a misguided Skua pounced down on a female as she was fluttering lamely around him, her young being in the neighborhood, but the duck flew "with a bound" and easily outdistanced her enemy. On several occasions Murphy and other collectors have seen Skuas swoop down and carry off in their bills Teal that had been shot.

FOOD VALUE. The marine diet renders their flesh strong and oily, but the young birds are excellent eating, especially if skinned first (von der Steinen, 1890).

HUNT. These birds have been consistently hunted by whalers, and great numbers have apparently been taken.

BEHAVIOR IN CAPTIVITY. None has ever been brought back to civilized countries alive.

ANDEAN TEAL

ANAS ANDIUM (P. L. Sclater and Salvin)

(Plate 37)

Synonymy

Querquedula andium P. L. Sclater and Salvin, Nomenclator Avium Neotrop., pp. 129, 162, 1873.

Nettion andium Salvadori, Cat. Birds British Mus., vol. 27, p. 263, 1895.

Vernacular Name

English: Andean Teal.

DESCRIPTION

Adult Male: Closely resembles *Anas flavirostris* but is larger. The mantle and scapulars are darker and more uniform, and the light edges of the feathers are reduced and darker. The breast is coarsely mottled, or barred, and never has the clearly defined round spots. The wing is the same.

Iris brown. Bill lead-blue instead of yellow and black. Legs and feet pale leaden blue with the joints dusky color. I can find no reference to flesh-colored legs as reported by Salvadori.

Compared with the Brown Pintail, this Teal has a more darkly spotted head, but there is a general resemblance, particularly in the lower surface. The wing of the Andean Teal has the same general speculum and wing-plan, and the central tail-feathers are acuminate. The upper surface is darker and the long scapulars lack the broad, light edges seen in the Brown Pintail.

Wing 214–230 mm.; bill 40; tarsus 38.

Adult Female: Plumage the same except that the breast spotting is rather less pronounced.

Wing 205–217 mm.

Young in Down: Not examined.

DISTRIBUTION

This species, which is closely related to the Yellow-billed and Sharp-winged Teal, is found in similar localities, but farther north. Its home is in the high Andes of Ecuador, Colombia and Venezuela. Fraser took a specimen between Riobamba and Mocha (P. L. Sclater and Salvin, 1876) and two others were taken near Quito (*ibid.*). The British Museum possesses others from Sical and the Rio Blanco, Ecuador; and the American Museum of Natural History in New York has a specimen from Antisana. Chubb (1919) has recorded a pair taken at Sinche Guaranda (altitude 4000 meters). Lönnberg and Rendahl (1922) obtained specimens at Pedregal on the north side of Cotopaxi and at Lake Mica Antisana.

Only a few specimens have been taken in Colombia. F. M. Chapman (1917) took one near Santa Isabel and the American Museum has another from Bogotá. Mr. M. A. Carriker has taken specimens with young in the Sierra Nevada de Chita (Boyaca district) and these are now in the Museum of Comparative Zoölogy at Cambridge.

This Teal has only once or twice been taken in Venezuela. Goering obtained specimens in the

Sierra Nevada of Merida (P. L. Sclater and Salvin, 1875). In the Culata Mountains of northwestern Venezuela Osgood and Conover (1922) saw eight on the Páramo San Antonio at an elevation of over 12,000 feet.

GENERAL HABITS

Few field-notes concerning this species have been published, and I am greatly indebted to Mr. M. A. Carriker, Jr., of Santa Marta, Colombia, who observed these birds in the Boyaca district, for a few notes on their habits. He writes: "As regards the Andean Teal sent to you, I have the following data available. They are found exclusively on or in close proximity to the lakes, ponds and marshes of the 'páramos' of the central and eastern cordilleras of the Andes, at least in Colombia; the western cordillera is not of sufficient elevation or extension to furnish habitat for them. They are seldom seen below 11,000 feet, and range up to snow-line, where conditions are suitable. They apparently sleep on the water, selecting the middle of the largest available lakes, but feed mostly on the shallow ponds and marshes, around the margins of the water, diving also in the shallower parts for food on the bottom. They associate together in flocks or pairs, and as a rule are not particularly shy unless persistently hunted, which is not often the case. They breed in the marshes and along the margins of the lakes where suitable cover is present. I secured young birds (probably about three weeks old) along the margin of one of the lakes in the Sierra Nevada de Chita, State of Boyaca, altitude about 14,000 feet, on March 13, 1917, and the following day a female, just beginning to lay. They are rather silent birds, with a weak call-note."

Osgood and Conover (1922) found them very tame in northwestern Venezuela. One flock of six was so loath to fly that they were thought at first to be unfledged. Two could not be forced into the air but sneaked under some bushes by the water whence they could not be dislodged. These lakes had very little vegetation and dropped right off into deep water so that the Teal must feed on the banks. According to the natives the breeding season is in August, but it is more than probable that nesting is not confined to any particular time.

MAP 53. Distribution of Andean Teal (*Anas andium*)

HOTTENTOT TEAL

ANAS PUNCTATA Burchell

(Plate 38)

Synonymy

Anas punctata Burchell, Travels in Interior So. Africa, vol. 1, p. 283, note, 1822.

Querquedula hottentota Smith, Cat. South African Mus., p. 37, 1837.

Anas pileata Lichtenstein, Verzeichniss Säugethiere und Vögel, p. 20, 1842.

Pterocyanea pileata Lichtenstein, Nomenclator Avium Mus. Berol., p. 102, 1854.

Anas hottentota Schlegel, Mus. d'Hist. Nat. des Pays-Bas, Anseres, p. 60, 1866.

Querquedula madagascariensis Grandidier, Rev. et Mag. de Zool., ser. 2, vol. 19, pp. 87, 255, 1867.

Nettion hottentota G. R. Gray, Hand-list Birds, pt. 3, p. 83, 1871.

Anas assimilis Hartlaub (*ex* Paris Mus.), Vögel Madagascar., p. 365, 1877.

Querquedula punctata Sclater, Proc. Zool. Soc. London, 1880, pp. 522, 534.

Querquedula pileata Schalow, Journ. f. Ornith., vol. 32, p. 177, 1884.

Querquedula cyanorhyncha Schalow (*ex* Boehm, MS.), Journ. f. Ornith., vol. 32, p. 177, 1884.

Nettion punctatum Salvadori, Cat. Birds British Mus., vol. 27, p. 265, 1895.

Vernacular Names

English: Hottentot Teal, Spotted Teal.

German: Gefleckte Ente.

French: Sarcelle hottentote.

Dutch: Gevlekte Eend.

Hova: Sadakely, Kintokely, Fotsielatra.

DESCRIPTION

Adult Male: Upper part of the head down to the eyes black, sharply contrasted with the buff-colored cheeks and throat. The buff color extends back on each side toward the occiput, leaving a mottled gray area on the sides of the neck. Mantle and scapulars dark brown, mottled with black. Back and rump black; upper tail-coverts vermiculated; tail black. Lower parts dark brown, thickly spotted on the breast with black, and indistinctly barred on the abdomen with the same color. Under tail-coverts vermiculated. Wing-coverts black with a greenish gloss. Secondaries metallic green on their outer webs, forming a speculum, which is bounded posteriorly by a black and then by a broad white band. Primaries dark brown. Under wing-coverts black, except the median and greater, which are white like the axillars.

Iris dark brown or black. Upper mandible black on the top, and bluish on the sides. Legs and feet slaty-blue to black.

Wing 140–160 mm.; bill 36; tarsus 28.

ADULT FEMALE: Similar to the male. Size slightly smaller. Color of soft parts the same.

IMMATURE SPECIMENS: Less heavily spotted on the lower parts, and with the top of the head more brownish (?). The under tail-coverts are said to be fawn-colored, and unspotted.

YOUNG IN DOWN: Not examined.

DISTRIBUTION

LIKE other African ducks the Hottentot Teal is essentially a non-migratory species, with a rather wide distribution. In the northeast its range extends as far as southern Abyssinia, where it has been taken on Lake Cialalaka in February (Salvadori, 1888), and on Lake Harrar Meyer in January (Ogilvie-Grant, 1901). It is not a common bird so far north, but on the lakes of Ankole (southern Uganda) it is quite plentiful (Ogilvie-Grant, 1905a; V. G. L. van Someren, 1916). R. B. Sharpe (1902) has recorded it from Entebbe, Uganda. According to F. J. Jackson (1906) it is a common bird on the Toro Crater Lakes, Ruwenzori range. In British East Africa it seems to be more common about Lake Naivasha than elsewhere, judging from the number of records (Ansorge, *fide* Reichenow, 1900; W. Stone, 1906; Bannerman, 1910; C. H. B. Grant, 1915; V. G. L. van Someren, 1922) but there are records for El Bolossa (W. Stone, 1906) and Lake Odah (Ogilvie-Grant, 1901). Schillings (1905) found it on the Nyeri Swamps.

Across the border, in what was formerly German East Africa, this Teal has been repeatedly found about Kilimandjaro, where it is common and breeds (Sjöstedt, 1910; Neumann, 1898) and on Lake Tanganyika (Matschie, 1887; Dubois, 1886a; Böhm, 1885). It has even been found on the Congo (west) side of Tanganyika, at the mouth of the Lufuko River (Böhm, 1885). Kothe (1911) describes it as a very common bird on Lake Sundu.

In northernmost Rhodesia the species was found to be not uncommon in the valley of the Luangwa (Neave, 1910) but there are no other records for Rhodesia, though Shelley (1896–1912) has reported specimens taken about Somba (British Central Africa) and in the vicinity of Lake Shirwa, Mozambique (Whyte, *fide* Reichenow, 1900; Shelley, 1896–1912).

In northern Bechuanaland this species was found on the Botletle River (Bryden, 1893), in the Okavango Basin and on Lake Ngami (Fleck, 1894). W. L. Sclater (1912a) has recorded it from the Tsende and Mazwe Rivers, and T. Ayres (1880) found it common in November near Potchefstroom. Horsbrugh (1912) states that he has shot it on the Orange River, and Bowker (*fide* Stark and Sclater, 1906) has taken it in Basutoland. It is not a common bird in Natal (J. H. Gurney, 1862) but has been taken on the Umfolosi River (W. L. Sclater, 1912a) and near Newcastle (E. A. Butler, Feilden and Reid, 1882). In eastern Griqualand it is rarely found near Matatiele (C. G. Davies, 1908). It seems to be a very uncommon bird in Cape Colony, described as rare at Port Elizabeth, with other records for the Zak River, Fraserburg Division, Swaarkops River and evidently for Verloren Vlei (Stark and Sclater, 1906; and others).

Like most ducks it is rare in Damara- and Great Namaqualand, occurring only in the rainy season, and most common at Omanbonde and a few of the lakes (Andersson, 1872; Fleck, 1894), but farther north it is abundant in Mossamedes and on the Rio Coroca, the northern limit being Cuanza (Barboza de Bocage, 1877–81).

Very little can be said about its status in Madagascar, but it has been taken at Morundava and Tamatave (Hartlaub, 1877), and F. R. Wulsin took specimens at the southern end of Lake Alaotra, and at Tulear, Bevero and Miandrivazo, in the southwestern and eastern parts, in June, July and September (Bangs, 1918).

MAP 54. Distribution of Hottentot Teal (*Anas punctata*)

GENERAL HABITS

The Hottentot Teal, in spite of its wide range, is a rather uncommon bird, excepting in a few localities. Almost nothing has been written concerning its life-history and, as it has never been observed in captivity, we know little of its voice, display or special behavior. It is essentially an inland species and, judging by its distribution, it seldom penetrates into the regions of rich tropical forests, seeming, if anything, to show a preference for higher country such as the vicinity of Kilimandjaro and Ruwenzori.

Nearly all travelers have found this bird confiding and rather easy to approach. Horsbrugh (1912) even speaks of it as tame and sluggish and Sjöstedt (1910) found it quite "bold" in the Kilimandjaro lowlands, while Kothe (1911) speaks of it as not wary. Only F. J. Jackson (1906) considered it really wild.

The flight seems to be light, silent and swift when once on the wing (Sjöstedt, 1910; Horsbrugh, 1912). The birds usually travel as singles or in very small groups, and no large flocks have ever been recorded.

Of the voice nothing whatsoever has been recorded, so far as I know.

Stomachs taken in the Kilimandjaro country and examined by Sjöstedt (1910) were filled with black volcanic gravel and digested parts of plants, apparently *Characeæ*.

Nothing is known of the pairing and nesting activities, and even the nest itself seems never to have been described. Sjöstedt (1910) found young half-feathered on July 31 on the Merker Lakes, Kilimandjaro. Two eggs collected in Ovampoland by Andersson are of a pale cream-color, and measure about 43 by 33 mm. (E. W. Oates, 1902).

As the account of its distribution shows, the crater-lakes of the Ruwenzori range and the lakes of the Kilimandjaro lowlands, as well as Sundu Lake (former German East Africa) are the places in which this duck has been found to be really common. On the Ruwenzori it was the commonest duck on one of the Toro Lakes, where between one and two hundred birds were seen (F. J. Jackson, 1906), and in the Kilimandjaro it was found exceedingly common (Sjöstedt, 1910). All over the southern part of Africa it is one of the rarer ducks and in many local lists of water-birds in and about the Cape Province it does not appear at all.

Sjöstedt (1910) speaks of this Teal as "delicious eating."

The species has never been brought alive to either Europe or America, so far as I have been able to discover.

ANDAMAN TEAL

ANAS ALBOGULARIS (HUME)

SYNONYMY

Querquedula andamanensis Tytler, in Beavan, Ibis, ser. 2, vol. 3, p. 333, 1867 (*nomen nudum*).

Nettion andamanensis G. R. Gray, Hand-list Birds, pt. 3, p. 84, 1871.

Anas andamanensis Giebel, Thesaurus Ornith., vol. 1, p. 344, 1872.

Mareca punctata Ball (*nec Anas punctata* Cuvier), Journ. Asiatic Soc. Bengal, vol. 41, pt. 2, p. 290, 1872.

Mareca albogularis Hume, Stray Feathers, vol. 1, p. 303, 1873.

Mareca gibberifrons Walden (*nec* S. Müller), Ibis, ser. 3, vol. 3, p. 321, 1873.

Querquedula gibberifrons Hume (*nec* S. Müller), Stray Feathers, vol. 8, p. 115, 1879.

Nettion albigulare Salvadori, Cat. Birds British Mus., vol. 27, p. 257, 1895.

Polionetta albigularis Fleming, Proc. Biol. Soc. Washington, vol. 24, p. 215, 1911.

VERNACULAR NAMES

English: Andaman Teal, Mangrove Teal, Oceanic Teal, Gibbery.

German: Andamanenente.

DESCRIPTION

ADULT MALE: Very similar to *Anas gibberifrons* but the top of the head is more uniform black, the sides of the head are unspotted, and there is a ring of white feathers around and below the eye. In specimens from North Reef Island the whole head is more or less white. Speculum nearly like that of *Anas gibberifrons*, but the first secondary is almost white on the outer edge and the wing-band is slightly wider and darker buff color.

"Legs and feet greenish blue to plumbeous, webs usually darker; bill plumbeous, nail black; in some the lower mandible, in one the terminal two thirds of this, pink; irides reddish" (Hume).

Wing 196–200 mm.; bill 35; tarsus 36.

Weight, 12 ounces to one pound (0.34 to 0.40 kilograms) (Hume and Marshall, 1879; Finn, 1915).

ADULT FEMALE: Same as male.

IMMATURE SPECIMENS: According to Salvadori the dusky markings on the under surface are less distinct.

YOUNG IN DOWN: Somewhat like the young of the Common Teal (*Anas crecca*) but much darker on the cheeks, and with some irregular white spots about the eye. There is no trans-ocular dark streak and the light superciliary streak is lacking. The light spots on the wing-rudiments, scapular area and sides of rump are about the same as in the Teal and in many other ducks (specimen at Tring).

ANDAMAN TEAL

HOTTENTOT TEAL

DISTRIBUTION

This Teal is confined to the Andaman group and is apparently far more common on South Andaman than anywhere else. So far as I know it has never been taken on Little Andaman, but in the north it has been found on Landfall Island and on Great Cocos, and once near Bassein on the Burmese coast (Hume and Marshall, 1879; Baker, 1908; N. F. Wilson, 1904; etc.). Fleming (1911) has recorded it from North Reef Island.

GENERAL HABITS

Haunts. This species is closely related to the Gray Teal of Australia (*Anas gibberifrons*) and, it seems to me, is quite wrongly placed by Sharpe in a separate genus with the Spot-bill (*Anas pœcilorhyncha*). It is little known to ornithologists. All we have learned of its habits we owe to the writings of Hume and Marshall (1879), Osmaston (1906) and Butler (in Baker, 1908). It is found wherever fresh-water lagoons exist, but flocks were also seen resorting at low tide to two rocky islets in the neighborhood of Port Blair at the head of the harbor (Butler). After the monsoon began (early June) these flocks of Teal broke up into small parties of five or six and retired to the creeks and dyke-intersected marshes a little inland. A month or so later they began to breed.

Wariness. Hume and Marshall (1879) did not consider them wild or wary when in pairs. Sometimes, in going up the creeks a pair would slip off the bank into the water and keep swimming about twenty yards ahead of the boat, only rising when hard pressed. He says, "They do not leave a place at the first shot, and Davison has got as many as eight by successive shots out of the same flock, the birds flying about and settling again at short distances. But they are eminently birds of a retiring habit, and very soon abandon, as a day haunt, any place which civilized or semi-civilized men begin to frequent."

Butler also found them extremely tame when in pairs in the small channels among the marshes. He was often able to creep close to them and one pair which he surprised at very close quarters merely fluttered like Water-hens along the surface, then pitched down and began swimming away. Birds that had been shot at, however, behaved very differently, and the flocks around Aberdeen were very wild, for they had been much hunted by the English residents.

Daily Movements. During the day these birds spend most of their time sleeping or perching in some inaccessible mangrove swamp, but in the evening they flock together and resort to fresh-water ponds or paddy-fields to feed (Hume and Marshall, 1879).

Gait, Swimming, Diving, Perching. According to Hume and Marshall, and Finn these birds are active both on land and on water. They do not attempt to dive

unless hard pressed but in a case of necessity can do so most vigorously (Butler, in Baker, 1908; Hume and Marshall, 1879). The birds regularly perch, and, as aforesaid, spend much of their time among mangroves.

Flight. The flight is fairly rapid and noiseless. Occasionally, when they have been kept on the wing for some time, a party will swoop down to the surface of the creek, as if they meant to pitch, then change their minds and rise again. When exercising this manœuvre they fly past at a tremendous pace (Butler). The white wing-bar is a distinguishing field-mark.

The flocks are usually of moderate size, about twenty or thirty (Hume and Marshall, 1879), but on the seacoast much larger congregations used to occur (Butler).

Association with other Species. On the creeks they are commonly found in the company of the Whistling Teal (*Dendrocygna javanica*), and Butler has watched them together on the water, but says that the Andaman Teal separate from the others when put up.

Voice. A male which died in the Calcutta Gardens had a well-developed bony tracheal bulb, very similar to that of the Common Teal (Finn, 1901a). This sex has a low whistling note, while the female utters a typical Teal-like *quack* (Finn, 1915). Davison (in Hume and Marshall, 1879) says he heard the whistling note only at night, when the birds were feeding. More than likely it is a note used mostly during the breeding season, as in many Teal and other ducks.

Food. No stomach analyses have been reported, and I know nothing of the feeding habits beyond the fact that the birds frequent the paddy-fields at night, and probably also find something to their taste on the salt-water flats.

Courtship and Nesting. Butler says pairing begins late in June, at which time the testes of the male were enlarged, although the ovaries of the females had undergone no change. The breeding season probably begins late in July and continues through August, but there is little to base this assumption on. The nesting season seems to follow the onset of the monsoon, which begins in June.

Apparently only two nests have been recorded. The first was found by Captain Wimberley in August in a paddy-field near Port Mouat (Hume and Marshall, 1879). The second was discovered by Osmaston near the top of a *padonk* tree on August 4. This latter writer says that as far as his experience goes they invariably nest in holes in lofty and often dead trees. The clutch evidently numbers about ten. The eggs are devoid of gloss, and of a uniform cream-color. In size they vary from 47.2–50.3 by 35.5–37.3 mm. The incubation period is not known. Butler notes that a

male accompanied the family on the only occasion on which he found a brood. The female flew round and round within twenty yards, uttering a low double *quack*, but the drake kept farther off and was silent. The male also accompanied the female and brood of a pair that nested in the London Gardens (Finn, 1907).

STATUS. This duck was never particularly numerous. What its history has been in the last quarter of a century I do not know; nor do I know what noxious mammals have spread to the Andaman Islands, but it does not seem likely that this region has escaped the introduction of some foreign pest, the curse of island faunas. The common occurrence of white-headed individuals like those described by Fleming (1911) may indicate a general reduction in numbers followed by inbreeding, which might quite easily account for this abnormality.

ENEMIES. Nothing recorded.

DAMAGE. Probably little or none.

FOOD VALUE. Butler found them generally fat, with tender skins, making them rather difficult birds to prepare as specimens. The supposition is that they are good table-birds.

HUNT. Nothing known, excepting that they were rather persistently hunted by the British officers around Port Blair. Butler speaks of as many as seventeen being shot with four barrels.

BEHAVIOR IN CAPTIVITY. These Teal have very rarely been imported into Europe. They were kept in the Zoological Gardens in Calcutta, where they turned out to be inveterate fighters, well able to look out for themselves even in competition with the Whistling Teal (Finn, 1915). Butler mentions one at Port Blair that thrived well on "paddy," but did not become very tame.

The London Gardens received specimens in June, 1903, and these bred in the years 1905 and 1906 (Hubbard, 1907; Wormald, *in litt.*). The Berlin Gardens possessed specimens at least as early as 1894 (Müller-Liebenwalde, 1894).

Finn (1907) says that the drake accompanied the duck in a pair which bred in London. The female nested on the ground, and the birds were at all times very active, perching freely. Since that time a stock of inbred Mangrove Teal has been kept up in these gardens. In 1922 there was only a single bird left and this one was almost entirely white-headed. The Curator told me the whiteness of the head had been progressive in this stock the more it became inbred.

GEOGRAPHICAL RACES

A SUBSPECIES of this Teal, based on a much whiter head, and other characters which do not seem of importance, was named by J. H. Fleming in 1911. I rather doubt the validity of this race, but include

it for the sake of completeness. This tendency to irregular white areas about the head was noticed by Finn (1907). It is probably analogous to the partial albinism found in the Laysan Teal, and due to close inbreeding in places where the species has been killed down to small numbers. Specimens in the British Museum from Port Blair and from Dungleaf Creek show a considerable amount of albinism, especially in a large, irregular patch at the base of the culmen and around the eye. A single bird which I saw at the London Gardens in 1922 was entirely white-headed and Mr. Seth-Smith told me that their stock became progressively whiter the more it was inbred.

ANAS ALBOGULARIS ALBOGULARIS (HUME)

CHARACTERS: Only a small white ring around the eye.

DISTRIBUTION: Southern Andaman Islands.

ANAS ALBOGULARIS LEUCOPAREUS (FLEMING)

Polionetta albigularis leucopareus Fleming, Proc. Biol. Soc. Washington, vol. 24, p. 215, 1911.

CHARACTERS: Irregular white area on face and neck. Head may be nearly all white, except on the crown.

DISTRIBUTION: North Reef Isle, and also probably middle Andaman.

BRAZILIAN TEAL

ANAS BRASILIENSIS GMELIN

(Plate 39)

SYNONYMY

Anas brasiliensis Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 2, p. 517, 1788.
Anas mareca Bonnaterre, Encyclop. Méthodique, vol. 1, p. 152, 1791.
Anas ipecutiri Vieillot, Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 120, 1816.
Mareca brasiliensis Stephens, General Zool., vol. 12, pt. 2, p. 138, 1824.
Anas paturi Spix, Aves Brasil., vol. 2, p. 85, 1825.
Anas notata Wied (*ex* Illiger, MS.), Beiträge z. Naturg. Brasil., vol. 4, p. 634, 1832.
Querquedula erythrorhyncha Eyton (*nec* Gmelin), Monograph Anatidæ, p. 127, 1838.
Querquedula ipecutiri G. R. Gray, List Birds British Mus., vol. 3, p. 138, 1844.
Querquedula novæ hispaniæ Reichenbach (*nec* Gmelin), Synopsis Avium, Natatores, pl. 110, fig. 981–982, 1845.
Querquedula brasiliensis Lichtenstein, Nomenclator Avium Mus. Berol., p. 102, 1854.
Nettion brasiliensis G. R. Gray, Hand-list Birds, vol. 3, p. 84, 1871.
Nettion brasiliense Salvadori, Cat. Birds British Mus., vol. 27, p. 266, 1895.

VERNACULAR NAMES

English: Brazilian Teal.
German: Brasilianische Krickente.
French: Sarcelle du Brésil.
Dutch: Braziliaansche Taling.
Brazilian: (Amazonia), Marreca-ananahy.
Spanish: Ananahy, Pato azulijo, Patite de creciente, Pato portugues.
Natives of British Guiana: Roppong.

DESCRIPTION

ADULT MALE: Anterior part of head brown; top of head, occiput and a band down upper side of neck black. Sides of the head, back of the eyes, and sides of neck, gray. Chin and throat brown. An irregular collar of black spots around the neck. Mantle and scapulars nearly uniform brown, with an olive tinge. Back and rump glossy black; upper tail-coverts light brown; tail black. Breast rusty brown, changing into a light gray on abdomen, all the lower surface being more or less marked with obsolete bars and spots. On the sides some large round black spots. Under tail-coverts like the abdomen. The wing is more brilliant and striking than in any other duck. Outer wing-coverts purplish black, except the last row of the greater ones, which are brilliant metallic green, like the outer secondaries. On the inner secondaries this green changes to dark purple or purplish green. The

speculum is bounded by a narrow black bar behind, and a large white patch, consisting of the posterior half of the secondaries, which are very long. Primaries dark brown, with a green gloss on the outer webs. Tertials like the scapulars. Under wing-coverts black, axillars white.

"Iris brown, bill dark crimson-red, legs and toes rich tomato red" (C. H. B. Grant, 1911).

Wing 180–194 mm.; bill 38–40; tarsus 38.

ADULT FEMALE: Like the male, but the brown of the forehead extends back over the whole top and back of head, and there is a white spot above and in front of the eye, and another at the base of the culmen. There are no black specks around the neck. The colors of the soft parts are entirely different from those of the male and show even in dried specimens.

"Iris brown, bill dark olive-brown, legs and toes not nearly so bright as in the male" (C. H. B. Grant, 1911).

YOUNG IN FIRST PLUMAGE: Similar to adult female (?).

YOUNG IN DOWN: These look a good deal like the young of the Common Teal or of the Mallard. They are dark above and yellowish below. The face pattern is Mallard-like and the trans-ocular streak runs forward of the eye. The light-colored patches on the dorsal side are the same as in the Mallard and many other ducks but they appear a little more prominent, especially the rump-patches.

DISTRIBUTION

THE Brazilian Teal is a bird of eastern South America, and like most tropical species it is essentially non-migratory. Only at the extremities of its range can it be spoken of as really a seasonal visitor.

In the north the species extends west as far as the Orinoco River in Venezuela. Von Berlepsch and Hartert (1902) have recorded it from Quiribana de Caicara, and Cherrie (1916) states that while it is not common on the Orinoco, he met with it at Bolivar, Altagracia, Caicara and Quiribana de Caicara. He found it abundant on the marshes near Las Guacas, on the San Feliz River.

Farther east this Teal is common in British Guiana (R. Schomburgk, 1848; von Berlepsch, 1908; C. B. Dawson, 1916) and it is fairly common in Dutch Guiana also (F. P. and A. P. Penard, 1908–10). No doubt its status is much the same in French Guiana, for on the adjacent coast of Brazil it was found common and breeding (Goeldi, 1894–1900).

In Brazil it seems to be generally distributed and apparently occurs throughout, excepting perhaps on the uppermost reaches of the Amazon. Natterer found it as far west as the Rio Branco (von Pelzeln, 1868–71). Goeldi (1894–1900) says it is common in northern Brazil, and he found it also on Marajo Island. It has furthermore been recorded from Para, Bahia, Matto Grosso, Minas Geraes, Rio Janeiro, São Paulo and Rio Grande do Sul (H. and R. von Ihering, 1907). Nicoll (1908) says he has seen it at Bahia in winter. Mr. R. Gordon Harris writes me that about Lossance (Minas Geraes) it is a fairly common bird, and that it breeds there. Salvadori (1900) has reported specimens from Carandasinho, near Corumba (Matto Grosso).

In Bolivia the species has been recorded from near Caiza (Chaco) by Lönnberg (1908), and the British Museum possesses a specimen taken near Salinas. Evidently the bird is only to be found in the lower regions of eastern Bolivia. It does not cross the Andes, and there is no good evidence for Gay's (1847) statement that it is found in Chile. Neither James (1892) nor Quijada (1910) includes it in their lists of Chilian birds.

This Teal is common in Paraguay (Azara, 1805; von Berlepsch, 1887a; Kerr, 1901; C. H. B. Grant, 1911) and in northern Argentina it is plentiful on the Rio Paraná and northward through the Chaco region to Tucuman (H. Burmeister, 1861; Hartert and Venturi, 1909). Bruch (1904) has recorded it for Oran in Salta, and Frenzel (1891) says it is common in Cordoba. It is a fairly common bird in Uruguay, and has been recorded from Concepción, Montevideo and Cerro Largo (Barrows,

MAP 55. Distribution of Brazilian Teal (*Anas brasiliensis*)
Questionable sporadic record indicated by a cross (×?)

1884; Aplin, 1894; Tremoleras, 1920). South of the La Plata, the Province of Buenos Aires is about the southern limit of its range. It has been recorded for this region by P. L. Sclater (1869a), Durnford (1878) and Hartert and Venturi (1909). E. Gibson (1920) states that at Cape San Antonio it occurs only in flood years, and is therefore called "Patite de creciente." In all his long experience in that region he only once found the species breeding. This Teal is said to occur in Patagonia (C. V. Burmeister, 1888) but this must be exceptional, and the statement does not seem to be based on clear evidence. If the specimens taken by Darwin (Gould, 1841) in the Straits of Magellan, and described as *Querquedula erythrorhyncha*, really belong to this species the record is certainly remarkable, and must be regarded as extra-limital.

GENERAL HABITS

HAUNTS. This so-called "Teal" as a matter of fact has no close relationship to any of the smaller ducks, not even to the Ring-necked Teal (*Anas leucophrys*). In its general appearance, and particularly in the rounded form of the wing, it is entirely un-Mallardlike, if I may use that term.

Throughout nearly the whole of its range it is confined to regions of tropical forests, where it frequents wood-enclosed waters, and often perches on the trees. Near Cape San Antonio, Argentina, where it is only a rare visitor and breeder, E. Gibson (1920) noticed that it was always found on waters in the vicinity of woods, and was partial to a pond in a wood, or even to a garden pond. In Guiana they are said to come to the coastal districts during seasons of drought, but as a general rule they do not show any preference for coastal or mangrove regions (F. P. and A. P. Penard, 1908–10).

WARINESS. Naturalists and travelers have always found this a tame bird, and one almost oblivious to the presence of man. Mr. R. Gordon Harris writes me that in the interior of Minas Geraes, Brazil, where he was collecting insects in 1919, this Teal was not nearly so wary as the Muscovy, and that it would leave the lakes only on extreme provocation. E. Gibson (1920) writing of the few pairs which occasionally visit his *estancia*, speaks of them as "surprisingly tame." He frequently passed by them within ten yards, while they were sitting on a pond, or perched on a tree or the "shears of a cattle well." When on the wing they showed even less regard for the shooter than did the Yellow-billed Teal (*Anas flavirostris*).

DAILY MOVEMENTS. No information.

GAIT, SWIMMING, DIVING, PERCHING. It would be interesting to know in what manner this bird feeds, whether it merely tips up like the Mallard, or whether it actually dives at times. In his letter to me, Mr. Harris speaks of their "swimming and diving about" in the water.

The bird is a free percher not only in the breeding season but at other times of the year too (P. L. Sclater and Hudson, 1889; E. Gibson, 1920).

Flight. The Brazilian Teal flies with wings rather depressed in such a way that in the proper light the observer is given a fine impression of the brilliant coloring on the coverts and secondaries. The flight is low and swift and the flocks are usually rather small, numbering from ten or twelve to twenty (E. Gibson, 1920; C. H. B. Grant, 1911; Harris, *in litt.*).

Association with other Species. It seems to be a rather independent, and for its size, a rather aggressive bird when brought into contact with other ducks. Over nearly the whole of its range there are no other surface-feeding ducks for it to associate with, but it is found in the same waterways as the Muscovy, and it is said to associate with the White-faced Tree Duck, though the two species form separate flocks when flushed (R. Schomburgk, 1848; R. G. Harris, *in litt.*).

Voice. The notes of the Brazilian Teal are easily distinguished from those of other so-called "Teal." The male's note has been described in various ways: as a "loud squeaking whistle" which bears no resemblance to that of *Anas crecca* (Heinroth, 1911) and as a "strong piercing prolonged whistle" (Rogeron, 1903). To a less prosaic and somewhat sentimental observer the note seemed a "long, plaintive whistle, singularly pure and sweet in sound, and usually heard in the evening" during the "love-season" (P. L. Sclater and Hudson, 1889). This note is used both during flight and when on the water. Heinroth (1911) tells us that when highly excited and especially when the female was scolding at another denizen of the pond, the male utters a sound like *wiwiwiwi*, or at times simply a *wiwi*.

The female has a quacking note, not different from that of other Teal, except that it is much louder. Heinroth (1911) says that when scolding, the female, too, utters a rough squeaking note. Mr. Harris, who at my request observed many of these birds in the field in Brazil, writes me that they utter a quacking note while swimming, and when startled and flying they give what he describes as a "grunt-like *quack*," often repeated, so that the birds could be heard before coming into sight. He evidently did not hear the male's note at all.

The trachea of the male was described but not figured by Eyton (1838). In a specimen which I saw in the U.S. National Museum the length was 130 mm.; it was uniform in caliber to the bifurcation where there is a well-defined tracheal bulb, roughly spherical, left-sided and about 9 mm. in diameter. It runs out anteriorly into a triangular-shaped bony lump.

Food. I am not aware of any published notes concerning the food of these birds, and can only quote a meager note from Mr. Harris, based on three specimens. Of these three only one had been feeding recently and this had the œsophagus and gizzard full of marsh fruits, with one bulbous root, one planarian (flatworm) and one semi-digested insect, apparently one of the Orthoptera (grass-hoppers).

RING NECKED TEAL

Male Female

BRAZILIAN TEAL

Male

COURTSHIP AND NESTING. Heinroth (1911), who had good opportunity to observe these birds in the Berlin Gardens, failed to see any particular display. This absence of real display postures seems to be quite common in South American species, at least where both sexes are brilliantly colored. When mated the birds show exceptional courage in attacking such large birds as swans or Semipalmated Geese, and there is little doubt that the males remain a long time with their mates, and as with the Chilian Widgeon, assist somewhat in guarding the brood and in bringing up the young.

In the southern part of its range, E. Gibson (1920) found one nesting on his place on November 4, and Hartert and Venturi (1909) found another nest near Ocampo as late as January 2. In the tropical part of its range the breeding season is probably much more irregular, apparently lasting from August to January in northern Brazil (Azara, 1805; Goeldi, 1894–1900; Euler, 1900).

The nest is usually located on the ground on the edge of a swamp or lagoon (Azara, 1805; Goeldi, 1894–1900; R. Schomburgk, 1848; Harris, *in litt.*). But the only Teal that E. Gibson (1920) ever found nesting on his estate in Buenos Aires Province had adopted a previous year's nest of what was probably the Yellow-breasted Marshbird (*Pseudoleistes virescens*), situated in the top of a stunted *tala* tree about eight feet from the ground, and without any lining. The clutch had been only slightly incubated. I strongly suspect that tree-nesting sites are far more common than recorded observations would indicate. As a matter of fact very few actual nests have been described, and it seems unlikely that these birds would be able to nest on the ground in strictly tropical surroundings.

The clutch numbers six or seven (Hartert and Venturi, 1909; E. Gibson, 1920) and the eggs are pure white in color, glossy, and inclined to be spherical in form. Indeed E. Gibson (1920) remarks that they might easily be attributed to an owl. The shell is not thick, but of china-like hardness, the worst he ever employed his drill upon. The measurements are 48–50 by 34–36 mm. The incubation period is unknown, but in an avicultural note (Audap, 1887) a female is described as commencing to sit on April 19 and hatching the eggs on May 18, making a period of twenty-nine days, which is unusually long for so small a duck. We cannot lay much stress on one record of this sort. In this same case the female began a second laying on June 9 and recommenced incubation on June 21, while the male took care of the first brood! It is certainly almost unheard of that a female whose eggs have not been destroyed or removed, should begin a second clutch before the young are able to look after themselves.

STATUS. This is the commonest of Brazilian *Anatidæ*, and, so far as one can say, has not been materially reduced in numbers in recent years, except, of course, in the vicinity of rising communities.

ENEMIES. Nothing recorded.

DAMAGE. Probably none.

FOOD VALUE. The flesh of this bird has been described as very good (Wied, 1832; R. G. Harris, *in litt.*).

HUNT. Both this duck and the Muscovy are hunted by the natives in the interior of Brazil (Minas Geraes). Mr. Harris writes me that the weapons used are ordinarily old-fashioned shot-guns, but in out-of-the-way places the natives still occasionally catch them alive in traps. Sometimes live birds so caught can be bought in small settlements for about $1.50 each in our money.

BEHAVIOR IN CAPTIVITY. Although a somewhat rare bird in collections, it has been regularly kept in Europe for some time. The famous old Knowsley collection, which was sold in 1851, possessed specimens, but the London Gardens did not acquire any until 1864. These Teal bred in the Gardens in 1878 and 1879, and again in 1886 and 1888. They were also kept in a number of private collections, where, as a rule, they have only occasionally bred. Mr. Wormald writes me that he has kept them, but not reared them, but this as well as many other species of ducks have been bred by Earl Grey (*in litt.*), and they were reared at Kew Gardens a number of years ago. In London they were rarely to be had; the price was £3 to £4 the pair, and doubtless at times much more.

In France the species seems to have been first successfully bred by M. Audap (1887) on whose ponds a female laid eight eggs and began to sit on April 19. On the 18th of May six eggs hatched and four young were reared. These were taken care of by the male, while the female, as related before, proceeded to lay a second clutch. M. Courtois (1880) says this was the only species of duck which did not lay eggs on his place. Neither Rogeron (1903) nor Mr. Blaauw (*in litt.*) ever bred them. Apparently they never were bred in the Berlin Gardens (Heinroth, 1911).

In this country the species has aways been extremely rare in collections, for most of the live South American water-fowl are shipped to Europe. It has never been bred in confinement here. The New York Zoölogical Gardens have purchased them at times for $9.00 each, a price much lower than the private individual would have to pay.

It seems to do well enough in captivity. Thirty-four specimens in the London Gardens lived about three years on the average, with a maximum of ten years, six months (P. C. Mitchell, 1911).

These Teal rank with the most beautiful of smaller water-fowl and it is a pity that more should not be imported so as to make them less expensive. I have never kept

them myself, but a characteristic which has been often remarked by aviculturalists is their independent behavior, and their great courage in attacking birds like swans or Semipalmated Geese. Rogeron (1903) gives a long account of a jealous male that attacked a female Mallard whose husband was the object of attraction for the Brazilian's mate. The Mallard Duck thoroughly trounced the plucky little Teal, and held him under water until he was very nearly drowned. Still, all through the breeding season, the pair of Brazilian Teal insisted on reserving part of the shelter house and part of the garden for their exclusive use.

HYBRIDS. Crosses between this species and the Chestnut-breasted Teal (*Anas castanea*), the Ring-necked Teal (*Anas leucophrys*) and the Bahama Pintail (*Anas bahamensis*), have been reared in confinement (Poll, 1911). The second of these, which was produced also by Earl Grey (*in litt.*), proved sterile (Poll, 1911), which is evidence that they are not very closely related.

RING-NECKED TEAL

ANAS LEUCOPHRYS VIEILLOT

SYNONYMY

Anas torquata Vieillot (*nec* Gmelin), Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 110, 1816.

Anas leucophrys Vieillot, Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 156, 1816.

Querquedula manillensis Eyton (*nec* Gmelin), Monograph Anatidæ, p. 125, 1838.

Anas rubidoptera Dubois, Ornith. Gallerie, p. 90, pl. 57, 1839.

Anas rhodopus Merrem, in Ersch and Grube's Encyclop., sec. 1, vol. 35, p. 45, 1841.

Querquedula torquata G. R. Gray, List Birds British Mus., pt. 3, p. 139, 1844.

Querquedula leucophrys Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.

Nettion torquata G. R. Gray, Hand-list Birds, pt. 3, p. 83, 1871.

Nettion torquatum Salvadori, Cat. Birds British Mus., vol. 27, p. 268, 1895.

VERNACULAR NAMES

English: Ring-necked Teal, Ringed Teal.

German: Rotschulter Krickente.

French: Sarcelle à collier (noir).

Spanish: Pato collar negro.

DESCRIPTION

ADULT MALE: Forehead gray, changing into black which extends back as a broad stripe over top of head to hind neck, where it bifurcates, forming a half-collar. Remainder of head gray, streaked indistinctly with blackish. Mantle olive gray, scapulars rich chestnut. Back, rump, upper tail-coverts and tail black. Breast pinkish buff to light rose-color, and covered with round black spots. Abdomen gray, very finely vermiculated. Flanks gray, more sharply vermiculated. Under tail-coverts black in the middle, and white at the sides. Wing-coverts black except for a large white patch on the secondary coverts. Secondaries bronzy green on the outer web, forming a conspicuous speculum. Primaries dark brown. Tertials long, extending to or beyond the primaries, and dark olive brown in color. Under wing-coverts black, axillars black.

Iris dark brown. Bill rich lead blue, with a black nail. Legs and feet a beautiful light lilac pink (captive specimens at Wenham).

Wing 168 mm.; bill 36; tarsus 33.

ADULT FEMALE: General color brown; superciliary stripe, middle of the cheeks, throat, and sides of the upper neck white; back and scapulars olive brown; rump and upper tail-coverts black; beneath dull whitish, with broad sub-apical pale-brown bands, better defined on the flanks; abdomen and under tail-coverts whitish, the latter powdered with dusky; wings as in the male; tail brown (Salvadori, 1895). Bill slightly duller blue than in male, and with a blackish saddlemark (Blaauw, 1919).

YOUNG MALE IN FIRST PLUMAGE: Somewhat like the adult female, but there is no pattern on the face, the barred flank feathers are absent and the breast and upper abdomen are spotted. The upper side is almost as in the adult female but more gray and less rich brown. Wing same as in adult female (specimens in Leyden Museum).

YOUNG FEMALE IN FIRST PLUMAGE: Said to resemble very closely the adult female and thus to differ considerably from the male at the same period.

YOUNG IN DOWN: Pure white underneath and dull brownish gray above. There is a marked superciliary white streak and a narrow trans-ocular dark streak. There are the usual whitish patches on the wing-rudiments, scapular region and rump. Legs and feet grayish flesh-color. Bill pale lead-color.

REMARKS: The adult or breeding plumage is kept practically intact throughout the whole year and there is no return to a less ornamental stage during summer. This does not of course mean that the usual double moults may not take place.

DISTRIBUTION

THIS rather rare Teal is confined to the countries bordering on the river basins of the La Plata region of South America. The northernmost record is for southern Bolivia, where it was found in March and April near Caiza in the Chaco (Lönnberg, 1903). Kerr (1901) says it is common in the Paraguayan Chaco in November and December, and Dr. A. Wetmore writes me that he saw a few in that region. There are specimens in the British Museum from Villa del Pillar, southern Paraguay. Salvadori (1900) has recorded a pair taken at Uruman, Matto Grosso, Brazil, and in extreme southeastern Brazil, in Rio Grande do Sul, the species is perhaps not uncommon. It was found by Aplin (1894) in Uruguay, and has been recorded from Cerro Largo, Uruguay, by Tremoleras (1920).

Bolivia

Paraguay

Brazil

Uruguay

In the Argentine this Teal is found only in the northeastern part, where it is said to be common (Dabbene, *in litt.*). The U.S. National Museum has specimens from Corrientes, the British Museum from Entrerios, and Lillo (1902) has recorded it from Tucuman. According to Schultz (*fide* Dabbene, 1910) it is a resident bird in Cordoba. The range does not extend south of Buenos Aires Province. P. L. Sclater and Salvin (1869) have recorded it from Conchitas, and Hartert and Venturi (1909) from Barracas al Sur. P. L. Sclater and Hudson (1889) state that it is a strictly migratory bird in Buenos Aires, arriving in October, and that it is rare in the interior. E. Gibson's (1920) more recent remarks are to the same effect. He says that the species is a rare visitor at Cape San Antonio, where it usually appears in September.

Argentina

GENERAL HABITS

ALTHOUGH usually placed next to the Brazilian Teal by systematists, there is no reason to suppose that the two species are at all closely related. Indeed, both of them are only distantly related to the "Mallard-like" ducks, and that is about all that can be said of them. We know less about the distribution, status and life-history of this species than of any South American duck, excepting perhaps the Brazilian Merganser. It inhabits tropical, mostly forested country, but it must be scarce even in the center of its range, for Mr. J. L. Peters, who in July, 1920, visited the Falls of the Iguazu, failed to get any trace of it along the main valley of the Paraná. Perhaps it is an inhabitant of isolated forest pools or brooks, as E. Gib-

son's (1920) notes seem to indicate. It reaches Cape San Antonio (Buenos Aires) only in flood years, when individual pairs make their temporary abode in isolated ponds or pools, quite regardless of the nearby traffic or dwellings.

Although in captivity it seems a peculiarly inactive bird, it is said to be very lively in its natural state, constantly flying about from place to place in the day or night (P. L. Sclater and Hudson, 1889). Full-winged birds in the Berlin Gardens perched skilfully, and flew well in a small flying-cage (Heinroth, 1911).

Mr. N. Hollister, the Director of the National Zoölogical Park in Washington, has kindly made some notes on the voice for me. The female, he writes, has a sharp *qu-ack*, a two-syllabled note, well defined, and not at all Mallardlike. He never heard any note from the male nor did I from the male I possessed. An aviculturalist of Heinroth's (1911) acquaintance, a Mr. Samereier, compares the note of the male in the breeding season to the weak *miau* of a cat, the note being soft and long-drawn-out, while the bird at the same time lifts his head.

These homely comparisons may be here relieved by the more artistic but perhaps less accurate description given by Hudson (in P. L. Sclater and Hudson, 1889). I quote: "On the water, especially in the evening, the male emits a long inflected note, plaintive and exquisitely pure in sound — a more melodious note it would be difficult to find, even among the songsters." One cannot help wondering whether this is the same as the catlike *miau* described by the German fancier. However, Mr. McLean who with Mr. Wormald has bred many of these Teal at East Dereham in Norfolk, England, gave me a similar idea. He said that in the nesting season, which is very late, the male's melodious note could occasionally be heard. It sounded to him something like the musical calls of the Long-tailed Duck, but even sweeter and more attractive. They had not begun to call when I saw his mated pairs on the 10th of May, 1922.

The display in this species has not been well studied. I have never seen it but it has been described to me as a throw "up and back" of the head at the same time that the call-note is given. The head is never brought back far enough to touch the rump as in some species of diving ducks. Samereier's statement (in Heinroth, 1911) that in the breeding season the male lifts his head while uttering the catlike love-note, evidently refers to the same simple act. Mr. Stacy, the Head Keeper at the New York Zoölogical Park, told me that he once saw the Ring-necked Teal in a rather elaborate display, but he made no notes of it at the time and could not remember the exact nature of it.

Neither the nest site, nest, nor even the eggs have been described, so far as I can make out. Blaauw's birds generally laid seven eggs, and in an informal account by Alvarez (1913) six or eight is given as the size of the normal clutch. Mr. Blaauw's captive birds seem to have preferred elevated nesting sites, and I think it extremely probable that in the natural state this bird commonly nests in trees. The incubation period (under hens, at least) was about twenty-three days.

MAP 56. Distribution of Ring-necked Teal (*Anas leucophrys*)

The Ring-necked Teal seems never to have reached Europe alive until about 1908, when the Berlin Gardens received a number of males, but no females. About the same time Mr. Blaauw acquired at least one specimen. Seth-Smith (1912) says about half a dozen males were imported into Germany at that time, and there must have been at least one female, for soon after, a few pairs, bred in Germany, were offered for sale. From this source the London Gardens obtained a pair in 1911, the first they had ever possessed. So far as I know, this pair never bred. But the stock which Mr. Blaauw obtained proved easy to breed, and he (1919) was soon able to give detailed descriptions of the various immature plumages. In England, Earl Grey has kept them. He writes me that they thrived but did not breed. Mr. Hugh Wormald, however, has bred them successfully, but I have no details concerning his experiences with them. I saw some at his place in May, 1922, but they had not commenced to breed.

A few of these Teal reached America in 1914–15. They were probably captive-bred, and were offered for sale by Louis Ruhe in New York. The New York Zoölogical Society received a pair on August 12, 1914, and both of these birds were still living in July, 1921. The male, which I examined carefully in March, 1921, had become very much darker, almost melanistic, on the mantle, and to a lesser extent on the cheeks. Mr. Crandall informs me that another male which the Gardens kept for some years, had, by the time it died, become even darker than the one I examined. The assumption of a melanistic plumage in captivity is rather common in many kinds of birds, but I never before knew of its occurrence in ducks. Mr. Blaauw thinks that the assumption of a dark plumage in his stock is a temporary affair coming and going with different moults.

A pair which I acquired in the spring of 1915 arrived in very bad condition. The male never really recovered its health, and died in the course of a few months; the female lived a good deal longer, but I could never make any satisfactory observations on either of them. They were extremely independent, and never seemed to mingle with the other small water-fowl among which they were kept.

No one has yet recorded much about breeding them. Mr. Blaauw (1919) says that his bird or birds deposited eggs in a box overhanging the water. The number of eggs was generally seven, and the incubation, presumably under a hen, about twenty-three days. One peculiar thing about Mr. Wormald's birds was the very late nesting, which is seen regularly year after year. The earliest eggs ever deposited at his place were on June 1, the latest of all the ducks. To my knowledge the species has never been bred in the United States.

Wild-caught birds have always been very hard to get and hand-reared stock is scarce and expensive, fetching around £12 the pair at the present time.

Hybrids. In the Berlin Gardens this Teal has been crossed with the Brazilian Teal, but the offspring proved sterile (Poll, 1911).

PINTAIL

ANAS ACUTA LINNÉ

(Plate 40)

SYNONYMY

Anas acuta Linné, Systema Naturæ, ed. 10, vol. 1, p. 126, 1758.
Anas subulata S. G. Gmelin, Reise Russland, vol. 1, p. 13, pl. 1, 1771.
Anas alandica Sparrmann, Mus. Carlsonianum, fasc. 3, pl. 60, 1788.
Anas sparrmanni Latham, Index Ornith., vol. 2, p. 876, 1790.
Anas caudacuta Pallas, Zoographia Rosso-Asiatica, vol. 2, p. 280, 1811.
Anas tzitzihoa Vieillot, Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 163, 1816.
Dafila caudacuta Stephens, General Zool., vol. 12, pt. 2, p. 127, pl. 49, 1824.
Trachelonetta acuta Kaup, Natürl. Syst., p. 115, 1829.
Anas caudata Brehm, Oken's Isis, 1830, col. 997.
Phasianurus acutus Wagler, Oken's Isis, 1832, col. 1235.
Querquedula acuta Selby, Illustrations British Ornith., vol. 2, p. 311, pl. 59–60, 1833.
Dafila acuta Eyton, Cat. British Birds, p. 60, 1836.
Querquedula caudacuta Macgillivray, Manual Ornith., vol. 2, p. 170, 1842.
Dafila longicauda Brehm, Naumannia, 1855, p. 297.
Dafila caudata Brehm, Naumannia, 1855, p. 297.
Dafila acuta a. *americana* Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.
?Dafila modesta Tristram, Proc. Zool. Soc. London, 1886, p. 79, pl. 7.

VERNACULAR NAMES

English: Pintail, Sprig-tail, Gray Duck, Pied Gray Duck, Gray Widgeon, Sea Widgeon, Sea Pheasant, Split-tail, Spike-tail, Pike-tail, Picket-tail, Water Pheasant, Smee, Long-neck, Winter Duck, Cracker, Pile-start, Spindle-tail, Lady-bird, Harlan.

French: Canard pilet, Pilet acuticaude, Pilet longue queue, Canard à queue effilée, Etiquenard, Canard long cul, Vingéon de mars, Vingéon fourchu, Canard faisan, Canard hirondelle, Canard flèche.

German: Spiessente, Spitzente, Pfeilschwanz, Pfriemenente, Nadelschwanz, Langhals, Schwalmente, Schwalbenente, Schnepfente, Graue Mittelente, Lerchenente, Fasanente, Spitzzackel.

Dutch: Piljstaart, Langhals.

Danish: Spidsand, Vinterand, Stjertand, Rumpeand, Strekand.

Norwegian: Spidsand, Piland, Stjertand, Spirand.

Swedish: Stjärtand, Spjutand, Viand.

CHILIAN PINTAIL
EATON'S PINTAIL

Icelandic: Grasönd, Grafönd, Langvin graönd.

Gaelic: Lacha-mhara, Lacha-stuach, Lacha-stiurach.

Lapplandic: Vuojas.

Finnish: Jouhisorsa, Jouhihäntä.

Russian: Shilochwost.

Polish: Kaczka rozenice.

Lettish: Garkaklis.

Czech: Ostralka.

Croatian: Patka lastarka.

Hungarian: Nyilfarku recze.

Italian: Codone, Anatra di coda lunga, Germano marino, Coda lancea, Carrabaru.

Sardinian: Agu.

Spanish: Rabilargo, Cua de chunc, Arrabio, Rabijunco, Anach marsench, Cua blarg, Cua d'auroneta, Cua de jonch.

Portuguese: Rabijunco, Arrabio.

Arabic: Bat, Batteh.

Maltese: Silfiun.

Hindu: Sinkpar.

Bengali: Dighans, Sho-lon-cho.

Sindhi: Kokarali, Drighush.

Nepalese: Digunch.

Tartar: Sikædum.

Ostiaks: Kurek.

Korean: Heitshogatshi.

Kamchatka: Kagachynatch.

Kuriles: Pakarichu.

Japanese: Onagagamo.

Eskimo: Imōōäk, Nah-ling-eiv-e-nuk, Ŭk-shúk-ŭk.

Mexican: Tzitzihoa.

DESCRIPTION

Adult Male: Head and upper neck gray, but darker and browner on the crown. Hind neck black, with a purplish gloss. Lower surface white, extending up on sides of breast and neck to a point on each side at the hind neck. Mantle, upper scapulars and flanks finely vermiculated with black and white wavy lines. Lower scapulars black, some of them with white margins. Back and rump gray. Central tail-feathers very long, pointed and black in color. Remainder of tail gray and buffy. Wing-coverts bluish gray, except the last row which carries a brown band. Speculum bronzy green margined posteriorly with a black, and then with a white bar. Speculum framed on the interior margin with black. Primaries blackish. Tertials gray and black. Lower abdomen finely speckled with gray. Sides of rump white, under tail-coverts black, except the outer ones which have a white edge. Under wing-coverts brown and white; axillars white with a brown shaft.

Iris dark brown. Bill black on the top of culmen and on nail, with the sides lead-blue. Legs and feet grayish or bluish gray.

Wing 260–280 mm.; bill 48–52; tarsus 39–44; tail very variable, up to 200 mm.

Weight 1 pound 10 ounces to 2 pounds 12 ounces (0.73 to 1.24 kilograms); only rarely above 2 pounds 8 ounces.

Adult Female: Top of head brown streaked with black. Rest of head and neck buffy or gray, streaked with dark brown or blackish. Mantle and scapulars dark gray to black, streaked and often

barred with white or buff color. Back and rump mottled gray and brown; tail brown. Lower parts mostly white with more or less indication of brownish bars and spots. Wing without a metallic speculum, but with an anterior and a posterior white wing-bar. Primaries dark brown. Under wing-coverts mottled. Axillars more or less barred with brown and darker than in male.

Iris dark brown. Bill bluish horn-color. Legs and feet greenish gray.

Wing 242–266 mm.; bill 45–50; tarsus 39–42.

Weight 1 pound 2 ounces to 1 pound 14 ounces (0.51 to 0.85 kilograms).

YOUNG FEMALE IN FIRST (JUVENAL) PLUMAGE: Very similar to adult female, but much more streaked with gray on the whole lower surface.

YOUNG MALE IN FIRST PLUMAGE: Like the young female, but the mantle is usually more conspicuously barred, and as soon as the wing feathers appear, the brilliant speculum of the male serves to distinguish it from the female. In September or October a few obscurely vermiculated feathers begin to appear on mantle, scapulars, or flanks.

MALE IN ECLIPSE: Darker and grayer than adult female, especially on the occiput, lower scapulars and tertials. The mantle and scapulars are more or less finely vermiculated with gray, the chin and throat are more spotted, and the lower side is somewhat streaky. The metallic speculum is always present unless the flight feathers have just been dropped. The eclipse male in this species is therefore a good deal less like the female than in many other ducks.

YOUNG IN JULY, before flight feathers are grown: Somewhat like the Mallard at a corresponding age, but there is no dark streak through the eye, and the top of the head is browner and less black.

YOUNG IN DOWN: Grayer and less yellowish on the lower side than the Mallard, with the eye-streak less defined, and with a brown area on the cheeks merging with the dark ocular patch. White body-spots as in the Mallard.

DISTRIBUTION

THE Pintail is one of the most widely distributed of all the ducks, being found throughout Europe and Asia, in parts of Africa, and in the greater part of North America.

BREEDING AREA

IN America the Pintail breeds throughout a very extensive range, but as in the Old World, less commonly south of 55°. To start with Alaska: Nelson (1887), who recorded it for the extreme eastern Arctic coast of Siberia, found it also on St. Lawrence Island in Bering Strait, and speaks of it as very abundant on the Alaskan shore of the Bering Sea, extending rarely to Point Barrow. F. S. Hersey (1916) did not see it north of Cape Espenberg, but C. H. Townsend (1887) and J. Grinnell (1900) record it as common in Kotzebue Sound, while Murdoch (1885) found it breeding near Point Barrow. Nelson (1887) found it on the Alaskan coast south to the mouth of the Kuskoquim, and has no doubt that it breeds on the Aleutians. There is no evidence of its breeding or occurring in this archipelago, however, except that L. M. Turner (1886) says it is found sparingly on Unalaska in November, but not later. Recently specimens have been taken on St. Paul Island in the Pribilovs, in May (Evermann, 1913). At the base of the Alaska Peninsula it was not common (Osgood, 1904), but it breeds in Glacier Bay on the south coast (Swarth, 1922) and has been recorded for Kadiak and Sitka by Bischoff (*fide* Baird, Brewer and Ridgway, 1884). In the interior of Alaska the species seems to be abundant throughout the Yukon Valley, from the mouth at St. Michael's (Bishop, 1900; F. S. Hersey, 1917), upstream

America

Alaska

MAP 57. Distrib
Breeding range, do

:ail (*Anas acuta*)
· range, broken line

at Nulato (Dall, 1874), Fort Yukon and the Porcupine River (Ibbiston and Lockhart, *fide* Baird, Brewer and Ridgway, 1884). Although rare at Point Barrow, the species unquestionably occurs all along the Arctic coast of Alaska, for eastward it has been recorded from Barter Island (R. M. Anderson, 1917) and Demarcation Point (W. S. Brooks, 1915), the MacKenzie Delta and Cape Bathurst (Stefánsson, 1913) and Liverpool and Franklin Bays (MacFarlane, 1908). Stefánsson says it breeds on the Arctic coast east to Coronation Gulf. From here the eastern limit of the breeding range extends southeastward until it strikes Hudson Bay at the 60th parallel. In the area west of Hudson Bay and north of about 55° is to be found the great breeding ground of the species. Within this area it was found very common in the whole region north and west of Lake Athabasca by Preble (1908), who (1902) also found it abundant on the coast of Hudson Bay from York Factory north to about 60°. Kennicott (*fide* Baird, Brewer and Ridgway, 1884) states that most of the birds breed north of Great Slave Lake and according to MacFarlane (1908) it is a very common breeder in the whole Anderson River valley, as well as on the Barren Grounds, where Richardson (*fide* Baird, Brewer and Ridgway, 1884) also found it abundant. In the whole area east and west of the MacKenzie, especially the territory about Great Slave and Great Bear Lakes it seems to be a particularly common species. Although it becomes rarer as a breeder the farther south one goes, it is still quite common on the west coast in British Columbia (Kermode, 1904) and inland in Athabasca (Frank Russell, 1898; Preble, 1908; Buchanan, 1920), Alberta (Spreadborough, *fide* J. and J. M. Macoun, 1909; Stansell, 1909; W. S. Brooks and Cobb, 1911), Saskatchewan (Raine, 1892; Bent, 1907; Ferry, 1910), and Manitoba (E. E. Thompson, 1891; Raine, 1892; Taverner, 1919). It apparently breeds also in Ontario. I have seen them very numerous in Hannah Bay (southern James Bay) myself in August, and I am convinced that some of these must have bred near there. Spreadborough (*fide* J. and J. M. Macoun, 1909) found it breeding on both the east and the west coasts of James Bay, and there is a young bird without wing feathers taken at Fort George (east coast) in the Museum of Comparative Zoölogy. In southern Ontario it breeds in small numbers on St. Clair Flats (Saunders, *fide* McIlwraith, 1894) and not rarely on the north shore of Lake Erie (Cooke, 1906), where in my opinion it seems to be increasing, for I saw several late broods unable to fly as late as October 2, 1916, in this region. Although there are nine records of the occurrence of this species in Labrador, one as far north as Ungava Bay (C. W. Townsend and Allen, 1907; C. W. Townsend, 1913), I do not believe the species ever nests there, and these records must therefore be regarded as sporadic. The same is true of the seven odd records given by Winge (1899) for the west coast of Greenland, where the species has occurred as far north as Upernavik and as far south as Julianehaab. Schmitt (1904) states that the species breeds regularly on Anticosti Island, but this is very exceptional, if true at all. According to Osgood a young bird in down belonging to this species was taken on the Magdalen Islands, but this too seems very remarkable. Chamberlain (1882) states that it breeds sparingly in New Brunswick, but this cannot be accepted. I am very skeptical regarding any breeding record east of 80° west longitude. West of this meridian the species breeds rarely in the United States as far east as Mississquoi Bay, Lake Champlain (J. B. Clark, *in litt.*) and on St. Clair Flats (Saunders, *fide* McIlwraith, 1894) and Rondeau, Michigan, as well as on Charity Isle, Lake Huron, Michigan (Wood, *fide* Barrows, 1912). In Wisconsin it breeds (Kumlien and Hollister, 1903; Cooke, 1906) rarely in the south, specifically at Grass Lake and Depere (U.S. Biological Survey) and now regularly at Delavan (Hollister, 1919). Cooke (1906) records two instances of the species breeding in northern Illinois, namely, at Calumet and at Will, while according to Woodruff (1907), it has once nested in the Chicago district. West of the Mississippi it has nested accidentally at Kansas City, Missouri (Cooke, 1906), while farther north it breeds in Hancock County, Iowa (Cooke, 1906; R. M. Anderson, 1907) and rarely in southern Minnesota; it nests more commonly in the central part of this State, and in fairly good numbers in the northern sections (Hatch, 1892). Cooke (1906) mentions Faribault, Waverley and Heron

Western Canada

Eastern Canada

Greenland

United States

Lake as specific breeding localities in Minnesota. The Pintail breeds commonly in North Dakota (Bent, 1901–02; Baird, Brewer and Ridgway, 1884) and sparingly in South Dakota (McChesney, 1879), according to Cooke (1906) at Vermilion, Scotland and Running Water in particular, while Visher (1909) says it breeds abundantly in certain counties. Cooke (1906) reports Kennedy and Hay Lake as the localities in which the species has bred in Nebraska, and recently Oberholser (1920) has stated that it nests commonly in the sandhill regions of the western districts, but I find no records of its nesting in Kansas. In Colorado it nests in Larimer, one of the northern counties (Smith, Breninger) as well as at Barr Lake near Denver, where it is not at all uncommon as a breeder (L. J. Hersey and Rockwell, 1909). North of Colorado, in Wyoming, the Pintail breeds, but is apparently rare (Grave and Walker, 1913; W. C. Knight, 1902). Cooke (1906) mentions Lake Desmet as a particular locality. It breeds in various suitable localities in Montana (A. A. Saunders, 1921) and farther west the species undoubtedly breeds in Idaho (Baird, Brewer and Ridgway, 1884) and certainly does so in Washington (W. L. Dawson and Bowles, 1909), specifically at Mabton (Cooke, 1906). It appears to be a not rare nester at Malheur Lake in Oregon, and Cooke (1906) mentions Rock Creek Sink as a definite locality for that State. On the other hand this duck is so much more common as a breeding bird in California that I do not believe it is to be regarded as a sporadic nester in the State. Grinnell, Bryant and Storer (1918) quote authorities for its nesting in Sutter, Alameda, Merced, Kings, Kern, Los Angeles, San Bernardino and Riverside Counties. This is apparently the region in which the breeding range extends farther south than anywhere else in the world. For the region lying between California and Colorado I find that it has several times been met with in midsummer in Nevada at Washoe Lake (Hanford, 1903) and on the Humboldt River (W. C. Hanna, 1904), while in Utah a considerable number breed on the Bear River marshes (Wetmore, 1921). Cooke (1906) states that it breeds questionably at Mormon Lake, Arizona, and I have little doubt that it breeds in suitable localities in the northwestern part of this State, as well as in Nevada and Utah.

Europe

In the Old World its breeding range extends north to 71° 30′ or even 72° and south normally to 36° or 37°, though it breeds commonly only north of 60°.

Iceland

In Iceland it is known to breed not rarely, and has been long known to do so, as is shown by Hantzsch's (1905) compilation of recent dates. It is only a very rare straggler to Greenland; there is one specimen from Nanortalik in the Schiöler collection (Schiöler, 1912).

Faroes

As far as I know it has never been recorded as actually breeding on the Faroes, though it is not rare there in summer, and undoubtedly breeds occasionally (H. C. Müller, 1869). Millais (1902) says that a few nest on the Faroes, his information probably coming from later verbal statements of Müller.

Shetlands

Henderson (1906) in recent years, has reported its nesting on the Shetlands, but it apparently does so only rarely.

Scotland

In Scotland, on the other hand, it is known to have bred in the Orkneys, on the Outer and Inner Hebrides, in Sutherland and Kinross, Moray, Inverness, South Fife, Selkirk, as well as in other localities (Baxter and Rintoul, 1921).

England

There seems to be some doubt as to whether the species breeds in England, though it has apparently done so in Northumberland (Seebohm, 1885).

Ireland

According to Payne-Gallwey (1882) it has nested in Ireland in Queen's County, and in Galway. There are no other breeding records for Ireland (Ussher and Warren, 1900).

Germany

On the Continent this duck nests in small numbers in certain localities in Germany, having been recorded from Schleswig-Holstein, Mecklenburg, Oldenburg, Westphalia, Hesse-Cassel, Brunswick, eastern Prussia, Brandenburg, Silesia, Saxony, Anhalt and doubtfully from Bavaria. In parts of Brandenburg and Silesia it appears to breed not uncommonly (Naumann, 1896–1905). It may be well to mention here the southern breeding records for Europe, all of which are to be regarded as unusual. One nest was taken in 1909 on the island of Texel, Holland (Van Eecke, Ardea, vol. 1, p. 67, 1912).

France

In France the species seems to breed sparingly on La Brenne plateau, southeast of Tours (Martin, 1887), and occasionally on the Maine River (Rogeron, 1903). Clarke

(1895) in recent years ascertained its presence in summer at the mouth of the Rhone. In Spain, according to A. Chapman and Buck (1910), it breeds in considerable numbers in wet years on the *marismas* of the lower Quadalquivir, Andalusia. Irby (1883) saw it in May at Santander on the coast of the Bay of Biscay, but I doubt its breeding there. In Switzerland it has bred a few times, but Fatio (1904) is probably correct in regarding these records as exceptional. The species has been met with several times in June and even July, in Italy, but probably does not breed (Picchi, 1904) although Naccari (*fide* Giglioli, 1886) claims it has nested in the vicinity of Venice. Fritsch (1872) and Schier (*fide* Naumann, 1896–1905) record the occasional nesting of this species in Bohemia, while in Hungary it breeds (Baldamus, 1858), specifically at Buzinka (Fischer, *fide* von Dalla-Torre and von Tschusi, 1885, p. 546), on Neusiedler Lake, at Balaton, and perhaps on Valencze Lake (Chernel, *fide* Naumann, 1896–1905). According to Szikla (*ibid.*) it has nested at Stuhlweissenburg in Transylvania, and this seems very likely, for Danford and Harvie-Brown (1875) found it in May in the same district, though it was not common there. In the Balkans a few may nest in Montenegro, on Lake Scutari (Reiser and von Führer, 1896). It has been met with as late as May 25 at Nicopolis, Bulgaria, on the Danube (Reiser, 1894), and according to Hristovic (*fide* Reiser, 1894) has bred at Dragoman, not far from Sofia. Going north, I find it recorded as breeding throughout Scandinavia, in Denmark (Kjärbölling, 1850), and in Norway (Collett, 1873; Schaanning, 1913) as well as in Sweden (Sündstrom, *fide* Dresser, 1871–81). The species appears to be rare as a breeder in southern parts of the peninsula, however, becoming common in the north only, as at Tromsö (Hartwig, 1889). In the Baltic it has nested on the islands Öland (Sündstrom, *fide* Dresser, 1871–81; Nilsson, 1858) and Gotland (Wallengren, 1854). According to Palmén (1876) the Pintail has bred in Finland south even to Helsingfors, but Palmgren (1913) says there is only one breeding record for the Helsingfors district. It nests only rarely in the southern districts, becoming a little more common in central Finland (Suomalainen, 1908), rather commonly in Karelia (von Nordmann, 1864), abundantly at Uleaborg (Dresser, 1871–81) and in eastern Finmark (Schaanning, 1907). Farther north it was found breeding in Lapland Enontekiensis (Suomalainen, 1912; Montell, 1917) as well as in Russian Lapland (Pleske, 1886) and on the Murman coast (Nikolski). In Russia proper it breeds abundantly throughout the northern sections south to about 60°. For this region it has been variously recorded for Shishgin Light on the White Sea (E. von Middendorff, 1891), the Kanin Peninsula (Goebel, 1873), and the lower Petchora (Seebohm, 1880a). At Archangel it also breeds abundantly (Goebel, 1873; Alston and Harvie-Brown, 1873), while farther south it has been recorded for Olonetz Government (Bianchi, 1914), Ladoga (Liljeborg, 1852; Meves, *fide* Naumann, 1896–1905) and for Onega (Sievers, 1877). In the Petrograd Government it is not exactly common as a breeder (Büchner, 1885; Bianchi, 1907), but eastward of the capital it nests commonly in the Novgorod Government (Bianchi, 1910) and also in Vologda (Andréeff and Bianchi, 1910). According to Sabanäeff (Harvie-Brown, 1878) it is common everywhere in the Urals of the Perm Government, and according to Russki (1893) it breeds also in Kazan. Passing westward, I find that it has been recorded breeding in Moscow and Tula (Menzbier, 1883; Lorenz, 1892), and it probably does so in decreasing numbers in the whole region between Tula and Charkov, or even Ekaterinoslav, where it nests sparingly (Czernay, 1852; Valkh, 1911). It does not breed in the Crimea or in Cherson (Brauner, 1894, 1899) but does so rarely in Kief (Harvie-Brown, 1878). Farther west it is known to breed in small numbers in Poland (Taczanowski, 1888), but more commonly in the Baltic Provinces, Kurland, Esthonia and Livonia (Loudon, 1909; Goebel, 1873). Before passing over into Asia I wish to mention the two remarkable records of the occurrence of this species north of Europe, namely, on Bear Island, July 15, and on Bell Sound, western Spitzbergen, June 13, 1898 (Kolthoff, 1903), and farther east on Waigats Island (Popham, 1898). Judging from the dates it seems possible that the birds may have been breeding in Spitzbergen, unlikely as such an assumption seems.

Spain

Switzerland

Italy

Bohemia

Hungary

Transylvania

Balkans

Scandinavia

Russia

I find no authentic record of the Pintail having ever bred in Africa, although its occurrence as late as May at various localities along the Nile has led some writers to think that such might be the case.

Africa

At Khartum it has been seen as late as June 1 (Vierthaler, *fide* Naumann, 1896-1905).

Asia

In southeastern Europe and southwestern Asia it breeds in Astracan (Seebohm, 1882) and at Sarepta on the Volga (Moeschler, 1853) as well as throughout the Kirgis (Suschkin, 1900; Nazarow, 1887) and undoubtedly also in Orenburg (Zarudny, 1889 90). The species breeds in the Caucasus (Radde, 1884) and in Transcaucasia on Lake Gotschai (Grosmann, *fide* Naumann, 1896–1905). Both Radde (1886) and Zarudny (1911) state that it nests rarely on the south Caspian, and the latter (1886, 1889–90) was told that it nested in Transcaspia at Merv; he himself found it on the Tedshen River in May. In Turkestan its southern breeding limit seems to be the mountain range of northern Persia and northern Afghanistan. Of course it does not breed in the desert regions of Turkestan north of Persia, that is, in the Kara-kum Desert, on the Ust-urt plateau, or the Kysyl-kum Desert, but it does nest in southeastern Turkestan, at least in Pamir (Severtzoff, 1883). Its status in this region is still far from being definitely determined, but I am quite confident that, like most species, it does not breed south of Pamir in the northwestern Himalaya region. East of Pamir, however, it breeds in northern Yarkand (Scully, 1876; Koslow, 1899) as well as in southern Kashgaria (Koslow, 1899). I do not doubt that it breeds in the western Tien-shan, and on Lake Issyk-kul, though I can find no evidence to substantiate this opinion. North of this region it breeds everywhere in central Asia and western Siberia, more rarely, of course, in the southern parts than in the north. Finsch (1879) found the species on the Ala-kul in May, and on the Marka-kul in June. Suschkin (1913) tells us that it breeds in the Russian Altai, and in Minussinsk, but this is perhaps its eastern limit in this region, for the birds certainly do not breed in the Dsungari Desert and probably not in the extreme eastern Altai. In central Asia the species was found in July in the Akmolinsk Government, and there can be no doubt of its breeding there (Bianchi, 1902). Passing northward the species breeds throughout the Tomsk and Tobolsk Governments, commonly on Lake Chany (Finsch, 1879; P. and J. Zalesski, 1915). It was also met with on the Tabol River at Jalutorowsk and on the lower Ob at Obdorsk (Finsch, 1879). On the Shchuchja River, which flows into the Ob on the left below Obdorsk, young were taken in August (Finsch, 1879). Farther north still it has been recorded for the Yamal Peninsula by Zitkov (1912) and westward for the Arctic island Waigats by Popham (1898). Passing eastward again, we find the species breeding abundantly in the valley of the Jenesei north to 72° (Popham, 1897, 1898) and south to Jeneseisk (Seebohm, 1879, 1880; Popham, 1897, 1898), although Palmén (1887) gives 70° 30′ as its northern limit on the Jenesei. A. von Middendorff (1853) found the species breeding on the Boganida. The southern limit of the breeding range in eastern Siberia is also rather vague, but we may assume that, as with many other species, the Pintail also breeds south to the northern boundary of the Mongolian deserts. Lönnberg (1909) has recorded specimens taken May 22 to 25 near Bura, and thinks it undoubtedly nests in northern Mongolia.

Mongolia Siberia

The species breeds rarely south of 55°, however, and Radde (1863) found this to be true in the eastern Sajan Mountains, while Taczanowski (1874) says the same for Transbaikalia. On the middle Amur the Pintail is not uncommon (Radde, 1863) and breeds also on the Sungari (von Schrenck, 1859). Prjevalski (1878) says it undoubtedly breeds on the Dalai-nor, and it certainly does so, sparingly at least, on Lake Hanka. He speaks of it as abundant also on the lakes of the Hoang-ho valley, but he must be referring to migration. Oustalet (1894) interpreting his English differently, concludes that it breeds there, a position which hardly seems tenable. Lake Hanka is a southern record for eastern Siberia, and even farther north the species is rare in the Amur country (von Homeyer, 1870), especially at the mouth of the river (von Schrenck, 1859). I am unable to say whether it breeds on Saghalin or not, but Borrissow (*fide* Hesse, 1915) found it there in May, and also took eggs which he thought belonged to this duck. Thayer and Bangs (1916) have recorded specimens taken in May at Sakachana. Taken all in all I believe the birds probably nest on the island, at least in the northern sections. I find no information concerning any occurrence on the Lena

beyond the notes of Maak (1859) and von Bunge and von Toll (1887). The first recorded it from Yakutsk and describes it as a common breeder on the Lena and Wiljui. The latter have recorded it from Werchojansk and say that many breed on the Adytsha River and that the range extends to 70° north latitude on the Jana. According to Palmén (1887) it breeds at the mouth of the Jana, 71° 20′, and it was found abundant eastward at the mouth of the Kolyma (Thayer and Bangs, 1914; Riley, 1918) while eggs were taken even farther east on Chaun Bay. From Kamchatka the species has been recorded by von Ditmar (1900) and Barrett-Hamilton (1900) and there are downy young in the Kuroda collection from that Peninsula. According to both Stejneger (1885) and Bianchi (1909) it is abundant on the Commander Islands in summer, where it also breeds. On the north coast of the Ochotsk Sea it was found to be very common around Gichiga (J. A. Allen, 1905) and according to this writer many go farther north to nest, a statement which gives some additional weight to Nelson's (1887) remark that it is the commonest breeder on the Arctic coast west as well as east of Bering Strait.

Commander Islands

Winter Range

In North America the Pintail winters as far south as Panama (P. L. Sclater and Salvin, 1864; W. Stone, 1918) and Colon (de Armas, 1893). Northward it winters, though rarely, on the coasts and in the interior of Costa Rica (Carriker, 1910; von Frantzius, 1869; Richmond, 1893), and in Nicaragua at the Lake (Nutting, 1882; Rendahl, 1919). I find no record of its occurrence in Honduras, but Salvin (*fide* Salvin and Godman, 1897–1904) found it on Lake Dueñas, Guatemala, and at Belize, British Honduras. In Mexico the species winters throughout, and has been variously recorded from Jalapa, Vera Cruz (P. L. Sclater, 1857), the Laguna del Mayorazgo and San Baltasar, Puebla (Ferrari-Perez, 1886), the Valle de Mexico (Villada, 1891 92; Herrera, 1888; Sanchez, 1877–78), Guanajuato (Dugés, 1869; Sanchez, 1877–78), Jalisco (Dugés, 1869; Sanchez, 1877 78; Beebe, 1905), Zacatecas (Richardson, British Museum), Tamaulipas (Phillips, 1911), Mazatlan, Sinaloa (Lawrence, 1874; Sanchez, 1877–78) and Cachuta, Sonora (J. A. Allen, 1893). According to Belding (1883) the species is common also in southern Lower California at La Paz and San Juan del Cabo. In the West Indies it is known from the Greater Antilles, namely Jamaica, where it is common (P. L. Sclater, 1910), and Cuba, where it is also numerous (Gundlach, 1875). It has been recorded also from Porto Rico (Gundlach, 1878) but Cooke (1906) says there is only one authentic record, while according to Wetmore (1916) its occurrence on the island is questionable. From observations made by L'Herminier (Lawrence, 1879) some seventy-five years ago, the species occurred also on Guadeloupe in the Lesser Antilles. In the United States the species is common in winter in all of the Gulf States, in Texas (Dresser, 1866; Strecker, 1912), in Louisiana (Beyer, Allison and Kopman, 1907), in Mississippi (U.S. Biological Survey), Alabama (Golsan and Holt, 1914), Florida (Cory, 1896; Scott, 1888, 1892) and along the Atlantic coast through Georgia, the two Carolinas (Wayne, 1910; and others) and the Virginias (Rives, 1890). It winters less commonly even farther north through Maryland (Kirkwood, 1895) and Delaware (Rhoads and Pennock, 1905), but is rare in winter in New Jersey, or at least uncommon (Cooke, 1906; W. Stone, 1909). It is also rare in winter on Long Island, New York (Eaton, 1910), and in Connecticut (G. M. Allen, 1909), apparently also at various points along the lower Connecticut River (Forbush, 1912), once at Lynn, Massachusetts (Cooke, 1906), and at Portland, Maine (Norton, 1912). Inland, a few winter in southern Pennsylvania (Warren, 1890), in southern Ohio (Gossard and Harry, 1912; L. Jones, 1903), doubtfully in southern Michigan (Cook, 1893), rarely but pretty regularly in southern Indiana (A. W. Butler, 1898), and in southern Illinois (Ridgway, 1895). In recent years the species has been regularly wintering locally in Wisconsin (Kumlien and Hollister, 1903; Cooke, 1906). South of the Ohio and east of the Mississippi it winters presumably in West Virginia (Rives, 1890), in Kentucky (Audubon) and undoubtedly also in Tennessee. West of the Mississippi, the Pintail winters in

Panama

Costa Rica

Mexico

West Indies

United States

southern Missouri (Widmann, 1907) and Arkansas (Howell, 1911), presumably in Oklahoma, as well as in southern Kansas, rarely in Colorado north to Barr Lake (L. J. Hersey and Rockwell, 1909), in New Mexico (Cooke, 1906) and Arizona (Swarth, 1914), undoubtedly in Utah, rarely in Nevada (Hoffman, 1881), but commonly throughout California (Grinnell, Bryant and Storer, 1918), in Oregon (Pope, 1895–96) and in Washington (W. L. Dawson and Bowles, 1909; Rathbun, 1915) extending north on the coast as far as southern British Columbia, being abundant everywhere in the vicinity of Puget Sound (Rathbun, 1915; Kermode, 1904). Mr. A. M Bailey of the U.S. Biological Survey (MS.) says that a few winter even in southeastern Alaska.

Europe

British Isles

The Pintail reaches its northernmost wintering grounds in the west of Europe where it spends the cold season on the coasts of the British Isles. According to Seebohm (1885) it is common on the south and east coasts of England, but rare on the west coast, and the same seems to be the case in Scotland (G. R. Gray, 1871). I have not been able to find any wintering records for the Shetlands or the Faroes, on which islands the species seems to occur only on passage to and from Iceland. In Ireland, however, it appears to occur in winter in the interior, as well as on the coast, but it is rare in the northern counties, as in Antrim, Londonderry, Down and Donegal. South of Athlone it is commoner, especially in Clare, Connaught and Kerry (Payne-Gallwey, 1882; Ussher and Warren, 1900). On the Continent the species winters as far north as the southern coasts of Norway (Collett, 1871; Schaanning, 1913), and probably to some extent in Denmark and Holland. Dubois (1912) states that it is common in Belgium on passage, but says nothing of its wintering in the country. According to Dresser (1871–81) and Paris (1907) it winters in France, but it is probably rare in the northern parts in winter. Martin (1887) states that a few winter on La Brenne Plateau, southeast of Tours, while in southern France, Lord Lilford (1875) found the species in the Cannes market on December 29. The British Museum has specimens from Arcachon, southwest of Bordeaux, taken in January and November. The Pintail does not regularly winter in Germany, but has been known to do so at Hamburg, Holstein, Oldenburg, Rhine Palatinate, Brunswick, Neuwied, Bavaria and more commonly in Baden (Naumann, 1896-1905). In Switzerland it is found everywhere in winter, but seems to be most common in the southwestern parts (Fatio, 1904). In the Iberian Peninsula it appears to winter abundantly. Irby (1883) met with it at Santander in November, but farther south it is very common in southern and eastern Spain (Arévalo y Baca, 1887). According to Barcelo (*fide* Reyes y Prosper, 1886) it is found on Mallorca and Minorca of the Balearic group. In Portugal it is common (A. C. Smith, 1868; de Seabra, 1910). Tait (1896) also found it abundant at Oporto, while the Museum of Coimbra has specimens from Monte-Mor. Jourdain (1912) states that the species is common on the east coast of Corsica, and in Sardinia it appears to be fairly well represented (Salvadori, 1865; Brooke, 1873). In Sicily the birds winter in the vicinity of Lentini and Syracuse (Malherbe, 1843), and C. A. Wright (1864) states that they winter occasionally on Malta also. According to Despott (1917) it is by no means common there. Apparently there is no part of Italy in which the species does not winter, for Giglioli's (1889–91) researches show records of its doing so from Apulia and Calabria northward through Campania, the Marches, Tuscany, Liguria, Venice, Lombardy and Piedmont. On the east coast of the Adriatic the species is very common in Dalmatia, from November till April (Kolombatović, 1903) and farther north appears to be fairly abundant in the Tyrol (Althammer, 1857). The Crown Prince Rudolf (Rudolf and von Brehm, 1879) stated that it occurred in the vicinity of Vienna in winter and Frauenfeld (*fide* Naumann, 1896–1905) has recorded it from Lower Austria. It appears that the Pintail winters occasionally in southern or even central Hungary, as it did at Turcsisca in 1876 (Madarász, 1884; Petenji, *fide* Naumann, 1896–1905). It certainly winters throughout the Balkans, commonly at Durazzo (Lodge, 1909), though it appears to be uncommon in Greece (von der Mühle, 1844: Lindermayer, 1860). Powys

Norway

Denmark

Belgium

France

Germany

Switzerland

Spain

Portugal

Italy

Austria

Hungary

Greece

(1860) has recorded it from western Greece, and according to that writer as well as Lord Lilford (1875) it is rather common on the Ionian Isles. Farther north it was found at Constantinople by G. C. Taylor (1872) and Braun (1908), and at Burgas, Bulgaria, by Radakoff (1879). **Bulgaria** Elwes and Buckley (1870) state that it winters in Bulgaria and according to Sintenis (1877) it does so on the whole lower Danube, especially in the Dobrudja. According to Radakoff (1881) it winters in Bessarabia, and von Nordmann (1840) claims that it does so in **Russia** southern Russia. I am skeptical about this latter remark, though Valkh (1911) states that it winters rarely in Ekaterinoslav.

In Africa the species winters in Tunis in great abundance (Zedlitz, 1909; König, 1888; Whitaker, 1905; Bédé, 1915; Millet-Horsin, 1912) but is apparently not so very common in Algeria (Taczanowski, 1870; Rothschild and Hartert, 1912). Tristram (1860) found it fairly **Africa** common in the northern Sahara, south of Algeria. Carstensen (1852) and Reid (1885) have recorded the species as wintering in Morocco. I find no record of its occurrence in the Azores, but a specimen was taken October 22, 1895, at Machico in the Madeira group (Schmitz, 1896), and another apparently in the Canaries on Lanzarote (Bannerman, 1914). In western Africa Pintails probably extend far south. I find by referring to de Rochebrune's (1883–85) elaborate **Western** work on the fauna of Senegambia (an apparently unreliable treatise, it is true) that **Africa** it is rather common on passage in that country, where it has been taken at Thionk, Sorres, Gandiole, Sedhiou and Daranka. The remark "on passage" may furnish a clue to an explanation of the fact that a specimen, unfortunately without date, has been taken at Zaria, northern Nigeria (Hartert, 1886). I am quite sure that most of the European ducks winter or pass along the west coast of Africa and winter as far south as Nigeria, where such startling discoveries concerning some species have been made. It may be that some actually cross the desert. Von Schweppenburg (1918) found remains of a Pintail in the Tuareg region, central Sahara. In East Africa the birds winter in great numbers in Lower Egypt and the Fayûm (Nicoll, 1919; Shelley, 1872; Zedlitz, **Eastern** 1910; Kaiser, 1890; A. L. Adams, 1870) but become rarer above Cairo (Shelley, 1872). **Africa** On the other hand reports seem to indicate that it is again abundant in Kordofan and the Sudan (von Heuglin, 1873, A. L. Butler, 1905). On the White Nile it occurs in flocks as far up as El Dueim, and El Kawa (Ogilvie-Grant, 1902: Jägerskiöld, 1904) and in Abyssinia it has been met with on Lake Cialalaka (Salvadori, 1884, 1888). The British Museum has specimens from Angolalla, north of Addis-ababa, Abyssinia. East of the Nile I find a solitary record for Capomazza, Eritræa (Salvadori, 1908). On the Blue Nile and in the Tigre region the species is known to occur (von Heuglin, 1873). Most astounding is the fact that in East Africa the species reaches the equator. Specimens have been taken in the Mau district, east of Victoria Nyanza (C. H. B. Grant, 1915) and in the Ankole district, west of the Great Lakes (Ogilvie-Grant, 1905a). V. G. L. van Someren (1916, 1922) met with it on passage, but not commonly, at Lake Nakuru and at Lake Naivasha, Kenia Province, British East Africa.

Passing to Asia I find the Pintail recorded for Suez (Zedlitz, 1910) and Arabia Petræa (von Heuglin, 1873) while Wyatt (*fide* Hart, 1891) reported it for the Sinai Peninsula. Very likely it occurs along the entire Red Sea coast of Arabia, for specimens have been taken at Lahej, near **Asia** Aden (R. Hawker, 1878) and at west Laikah, in the Hadramant region (von Lorenz and Hellmayr, 1901). It winters in Palestine (Tristram, 1884; Meinertzhagen, 1920a), and unquestionably throughout Asia Minor. Danford (1878, 1880) found it very abundant about Marash in the Taurus region in late January, and in northern Asia Minor G. C. Taylor (1872) found it to be common at Ismid, southeast of Constantinople. Lord Lilford (1889) has recorded the species for Cyprus where it is common (Bucknill, 1910). Farther east Pintails winter in the Caucasus (Radde, 1884), but perhaps chiefly in the southeast, at Lenkoran and vicinity. They winter also in the valley of the Tigris and of the Euphrates (Meinertzhagen, 1914) and the British Museum possesses skins from Babylon and Bagdad as well as from Fao at the head of the Persian Gulf. In Persia the species

winters on the southern Caspian (Radde, 1886) and in Kuhistan, Kirman and the Seistan (Zarudny, 1911; Baker, 1919). In southern Persia it winters in the Mesopotamian and Zagross regions (Zarudny, 1911) and in southern Afghanistan about Kandahar it is common (O. B. St. John, 1889). Zarudny (1911) states that it winters in southern Baluchistan also, but Meinertzhagen (1920) says only a few winter at Quetta. North of Persia it is stated by Dresser (1876) to winter in northwestern and southwestern Turkestan, by which he refers in general to the region along the Syr-darja River, even to the Aral Sea. It may be that it winters throughout the mountainous regions north of Afghanistan, that is in Buchara, Samarkand and Ferghana, but I must confess that the extension of its wintering range down the entire Syr-darja valley to the Aral Sea seems somewhat doubtful. It has, however, been found in February on the Naryn River (Laubmann,1913) and in the Tien-shan at Tschinas in early March, at Ulan-ussu in September, and at Angssi in February (Pleske, 1892). The fact that so many of these birds start north in February from Persia and India makes it extremely difficult to interpret simple dates without further information. I believe in this region it winters as far north as the Tien-shan, for in Kashmir it is common in winter (Adams, *fide* Hume and Marshall, 1879) and according to Hume, quoting Scully, it is common in the Himalayas as well as south of them. In India it appears to be locally common everywhere, though in the Deccan it is somewhat rare. It winters south, however, even to Ceylon (Legge, 1880). Eastward it is common in northern Siam and upper Burma (Hume and Marshall, 1879; E. W. Oates, 1883), very abundant in Arakan (Hopwood, 1912), common in the South Shan States (Bingham and Thompson, 1900; Rippon, 1901) but rare in southern Tenasserim (Baker, 1908) though it has been found at Moulmein (Hume and Marshall, 1879).

Persia

India

Farther to the east the species winters throughout southern and central China, whence it has been recorded for Yunnan (R. C. and Y. B. Andrews, 1918), Hainan (Hume and Marshall, 1879), Hong-kong and Amoy (Vaughan and Jones, 1913; R. Swinhoe, 1860), Swatow and Foochow (La Touche, 1892), Formosa (R. Swinhoe, 1863) and Ningpo (R. Swinhoe, 1873). In the interior it is said by Styan (1891) to be abundant on the lower Yangtse from Hankow to the delta, and La Touche (1922) records it as common at Shasi, Hupeh, in winter. Seebohm (1884) has recorded it from Kin-kiang on the Yangtse, and E. H. Wilson (1913) found it far in the interior of western China at Kiating, Szechwan Province. The species does not seem to winter as far north as Peking, but is found in Korea about Seoul in mild winters (C. W. Campbell, 1892).

China

In Japan it winters commonly in the south (Blakiston and Pryer, 1882), apparently north even to Tokio and beyond (M'Vean, 1878), but hardly in the extreme north of Nippon or on Yezo. On the islands of the Pacific the species has been found on Tanegashima in the Loochoo group and it apparently winters quite numerously and regularly in Luzon, Philippines (R. C. McGregor, 1909). There are four or five records of its occurrence in northwestern Borneo, whence the British Museum possesses specimens from Bintulu, Labuan and Sarawak, and the Sarawak Museum has a specimen taken at Kapit Fort. In 1886, Tristram (1886) recorded the occurrence on Sydney Island, Phœnix group, of a Pintail which he called *Dafila modesta*. Salvadori (1895) confesses he is unable to distinguish the specimens from some examples of *Dafila acuta*, but on account of the locality he is loath to identify the two as being one and the same species. It seems highly probable, however, that these specimens are true Pintails, when one takes into consideration the reports of enormous flights of ducks over the Marshall Islands, first recorded by Schnee (1901), and later discussed by Reichenow (1901). These flocks, appearing off Jaluit each year in October and May, are said to consist of Pintail, Green-winged Teal, Baldpate and Canvas-back, and their destination is undetermined. Consider, also, that the Pintail is common in winter throughout the Hawaiian group (Henshaw, 1902; R. C. L. Perkins, 1903; S. B. Wilson and Evans, 1890–99) and that these islands are only 10° of longitude east of the Phœnix and 30° east of the Marshall Islands, and we have a fairly convenient steppingstone across the Pacific to the North American continent.

Japan

Philippines

Borneo

Hawaiian Islands

Off the coast of Central America many specimens were seen on Clipperton Island during the second half of November (Beck, 1907).

Passage Area

The passage area comprises, of course, the region between the breeding and the wintering territory; and over much of the southern breeding, and the northern wintering ranges the species is chiefly a bird of passage. In America some migrants pass over a large section of the country that is well outside the summer and winter home, particularly in the autumn flight. This includes much of eastern Canada, New York, New England, Pennsylvania and New Jersey. Over most of this region they are only autumn stragglers.

In the Old World the passage area is roughly 20° of latitude in width, but in western Europe the breeding and the wintering areas greatly overlap, while in central Asia they are widely separated, where rigorous winters show their effect.

Migration

Some work has been done with banded Pintails by Mortensen in Denmark and also under the auspices of the Helgoland Ornithological Station with Sylt as a base. Results show that these ducks migrate as individuals much farther than Mallard and Teal, and that migrants visit the same spot year after year. "Repeat" records in the decoys of Fanö demonstrate this. It appears that the young birds have a tendency to return to their birthplace. American banding work will also be mentioned. As regards dates of migration the remarkable thing about the Pintail is the early start for the north in spring. So many start north in February that it becomes difficult, when records are meager, to determine whether specimens were wintering or migrating, since the birds frequently linger in central Europe for a month or even longer before continuing on their journey. In southern Europe, as in Dalmatia, Tyrol and also Portugal, there are few birds to be seen after the end of February; the average date of arrival in Hungary for fifteen years was March 7, but in north-central Europe they linger in considerable numbers until late April and even early May. The same applies to various localities in northern Africa where the species is not infrequently found as late as late April, a situation that gives rise to the unanswered question, "Where do these birds breed?" In Asia the same conditions obtain. According to Hume most of the birds leave India early in March, but some linger in the North, and in Kashmir until April. On the other hand Prjevalski found this species to be the commonest in the enormous flocks of ducks which passed east-northeast over Lobnor, central Asia, in early February. He tells us that they appear on the Zaidam, February 18, on the Kuku-nor in early March and in the Hoang-ho valley and Lake Hanka in late March and early April. In extreme northern East Siberia they arrived at Gichiga May 8, and at the mouth of the Kolyma on May 22. These facts show how long the species takes, as a whole, to make the full journey, although this, of course, does not necessarily apply to the individual. The same thing is illustrated by the fact that in Europe the birds do not appear on the Kola Peninsula until early June. Hantzsch (1905) states that the first birds arrive in Iceland on April 23.

In America the migration is equally early, as is shown by Cooke's (1906) data, many of the dates being averages for a number of years. A selection from these shows that Pintails arrive in Indiana February 21, in Illinois February 26, in Iowa February 18, in Nebraska February 23. Much earlier dates, even in late January, are common (Howell, 1911). In the East they appear in western Pennsylvania March 11, New York March 25, southern Ontario April 18, Montreal April 23, Prince Edward Island April 24. In the Middle West the birds travel north faster, reaching South Dakota March 8, North Dakota April 3, Manitoba April 8, Saskatchewan April 10, Great Slave Lake May 1, Fort Confidence May 22. Farther west some dates are: Montana April 1, Alberta April 7, St. Michael's, Alaska, May 1, Point Barrow June 18 (1882).

The autumn migration of this species is also early. Some of the young birds start out as early as

late August, but most pass south pretty steadily in September and early October, though in southern Europe and India few appear before early November, since they linger for some time just north of the great wintering area in the two continents, due, perhaps, to the presence of the great central, east-to-west mountain chain, which the birds hesitate before crossing, and which acts temporarily as a barrier. In America there is no such barrier and Cooke remarks that the last birds leave the Arctic about the same time that the first reach the Gulf of Mexico. The last were seen at Point Barrow September 7, at Kowak River, Alaska, September 14, at St. Michael's, Alaska, October 10, at Fort Franklin, MacKenzie, September 27. On the other hand, in southern Canada and northern United States the first real flight is in early September, and the bulk have left by the middle of October.

Dr. T. S. Palmer of the U.S. Biological Survey tells me that he has seen flocks of thousands of Pintails and Shovellers on the grounds of several clubs, some sixty miles south of Los Angeles, California, in late August, and he thinks these were mostly migrating birds. The females and young migrate earlier as they do in the case of many other species and go farther south than the adult males. This fact has been noted repeatedly by many observers. Autumn stragglers to New England, eastern Canada and the Bermuda Isles, are apparently all young of the year.

The largest set of return records in America comes from a lot of two hundred and twenty-one Pintails banded by Wetmore at Bear River, Utah, in early autumn. Of these, thirty-five have been reported as killed up to March, 1921, or an artificial mortality of at least 15%, as follows: California, 8 (central region 7, extreme south 1); New Mexico, 1; Texas, northern and southeastern, 2; Montana, northeastern, 1; Nebraska, western, 1; Arizona, east-central, 1; Missouri, southwestern, 1; Oklahoma, north and south, 2; Saskatchewan, south, 2; Utah, 16. Most of these were taken the same autumn and winter in which they were banded. These records bring out a very interesting fact, hitherto not suspected, of a broad east-and-west, and even northward dispersal, from a breeding center. They prove the complicated nature of migration beyond any doubt.

A Pintail trapped at Avery Isle, Louisiana, February, 1918, and shipped to Ithaca, New York, was released from there March 18, 1918. It was shot at Camrose, Alberta, September 22, 1920. Another banded at Avery Isle, Louisiana, February 12, 1917, was shot in the same general region September 15, 1920, while yet others banded there were shot later in Saskatchewan, Minnesota, North Dakota and Wisconsin (U.S. Biological Survey records).

Of 320 Pintail banded in a duck-decoy on the Danish island of Fanö (west coast) in the autumns of 1908, 1909 and 1910, no less than 67 or 20% were recovered, mostly at a distance, as follows. In winter three were recovered in the British Isles, eight in Holland, twelve in France (mostly in the northeast and on the west coast), six in Spain (one on the south coast and the rest on the east), eight in Italy (mostly Adriatic coast) and two in Austria-Hungary (Adriatic seaboard) as it then was.

In summer two were taken in southern Sweden, three in Finland (one as far north as north latitude 68° 27′) and nine in Russia. These Russian records range from Kief in the southwest and Novgorod in the west to the eastern side of the Urals (59° 51′ east longitude) and to the region east of the White Sea (farthest 67° 36′ north latitude and 52° 30′ east longitude). Besides these, sixteen were recovered near the place of marking in Denmark (see Mortensen, Dansk. Ornith. Foren. Tidskr., 1914, pp. 113–159: also British Birds, vol. 16, p. 271, 1923).

Reports of Pintails banded at Helgoland and taken at the Friesian Isles, in Holland and Denmark, do not show anything of especial interest (Krüss, 1918). Still other banded Pintails reported by Weigold (1912, 1913a) seem to show that birds apparently coming from northern Finland pass through Sylt and winter as far north as the Dutch coast, even in severe winters.

From this it will appear that our study of migration by banding has only just begun, and that it is a far more intricate puzzle, geographically, than any one had previously thought. W. S. Brooks (1915) during a summer on the Arctic coast of Alaska saw a flock of these ducks flying east at Demarcation Point; so that with this as with other ducks, there are distinct west-to-east and east-to-west movements on the Arctic coasts.

GENERAL HABITS

It is difficult to know what to say and what not to say about a species like this, which I believe, taking the whole world into consideration, outnumbers any other duck. It may be less familiar than the Mallard to those who have never seen much of water-fowl, but it is certainly not so to the average sportsman, traveler and naturalist. It is as much a true duck as the Mallard, and may perhaps be thought of as having a good deal in common with the Widgeon and the Green-winged Teal.

Its habits vary so much with the nature of its surroundings, that general observations would mostly fail to serve any useful purpose. It is just as adaptable as the Mallard, but its wary nature and fondness for large sheets of water rather than marshland, pools and streams, enable it to keep out of reach of danger points. I think that in proportion to its numbers less are shot than of any other common shoal-water duck, except perhaps the Widgeon. It does not care about salt water particularly, but often lives in tidal districts on our North Pacific coast and in western Europe, and in India where brackish sounds are absent. Its most noteworthy habit is its extremely early migration, both northward and southward, as well as its tendency to nest early.

The Pintail is easily identified in the field by its long neck and slim build. In flight the wings are seen to be long as well as very narrow and pointed and they are depressed below the body more than in the Mallard, reminding one of the Widgeon. Its slender shape and conspicuous colors seem to have impressed themselves on the minds of the ancients, for the Pintail is more often represented on the walls of Egyptian temples and tombs than any other duck. The hieroglyph of a duck under a circle, which is translated as the son of a sun, was meant to represent this species. For some reason they selected this duck from among many others to symbolize the royal conception. Old-dynasty artists often drew it flying with the tail spread to show its length and I have seen a pair of males represented as facing each other with the long necks crossed or actually wound together.

Wariness. Millais (1902) says, and I think rightly, that the distinguishing trait of the Pintail is its shyness. Owing to this it makes off to sea on the British coast at the first streak of dawn, and is perhaps more careful to avoid man than any other duck. It seems to be the hardest duck to approach with a punt, but when it is feeding at night on the *Zostera*, in company with Mallard and Widgeon, a successful shot is sometimes made. Its general alertness and its long neck enable it to note danger even before the Mallard in most cases, and it is not much given to circling about or investigating after it has once been alarmed.

Scattered through the literature one finds many references to Pintails being tame. It is certainly true that single birds and sometimes small lots of young birds will act

extremely foolishly, and will come to decoys as easily as any other duck. But a flock that contains many old drakes is almost certain to edge away and finally tower up long before it comes within range of the concealed shooter and his wooden imitations. It takes hard weather, dull skies, and a heavy breeze to split up the larger flocks and get them "gentle" so that they will come easily to decoys.

Its ability to keep out of the pipe-decoys in England is well shown by the available records of those, at one time, important institutions. But when given protection it soon becomes tame and familiar as any one can bear witness who has viewed them by the thousands walking about on the lawns in the city park of Oakland, California.

Daily Movements. Pintails do not differ from Mallard or Teal in respect to their periods of activity. They begin to flight very early in the morning and, where they are at all disturbed, they retire to the open sea or to large expanses of fresh water, where they spend the day dozing or preening their feathers. Uneducated birds and those on migration are of course much less regular in their movements. Only on some of their winter haunts do they become strictly nocturnal.

Gait, Swimming, Diving. Many writers have gone out of their way to expatiate on the grace and beauty of the Pintail, but to my own mind the long neck which gives it a somewhat goose-like appearance, and the pointed tail, do not add particularly to its good looks. Its general appearance is certainly different, but in no way more elegant than that of the Mallard, Widgeon or Teal.

Pintails never perch, so far as I know, neither do they dive, excepting rarely in captivity. Their long necks enable them to feed comfortably even in fairly deep water by tipping up in the usual Mallard-like fashion. They are very nimble runners on land.

Flight. The Pintail's flight is certainly very rapid, but perhaps not more so than that of many of its relatives. It rises from the water almost perpendicularly, and the wings make only a slight hissing or rushing sound. While on the wing the neck is carried somewhat lower than in the Widgeon, and a suspicious bird can be seen twisting his head curiously from side to side while he peers down at the crouching sportsman.

Flocks vary greatly in numbers, running all the way from small family parties of from six to ten up to enormous aggregations of many hundred. But it is essentially a gregarious bird and large flocks are more common than in the case of the Mallard. Mr. H. Gardner, in a letter to me, speaks of having seen a flock of at least two thousand migrating through Colorado and flying in six sections. According to Payne-Gallwey (1882) they preserve no particular formation while on flight and of course this is true on short journeys where they are resident, but on migration the flock

formation is the same as in many other ducks: long, wavy, irregular lines with the individuals flying abreast, or nearly so.

Association with other Species. The Pintail is one of the most sociable of ducks, and mingles freely with almost all shoal-water species, particularly the Mallard, Widgeon and Teal. In the early autumn on our great prairie sloughs one finds it in the company of Blue-winged Teal as well as of Shovellers. In the Old World its habits are the same, and many writers mention its association with the Mallard, European Widgeon, Gadwall and Common Teal. In the Far East it seems to show partiality for the Falcated Teal (Prjevalski, 1878). If anything, it shows preference for the Widgeon. I once took a photograph showing a flock of at least two thousand ducks, almost entirely Pintail and American Widgeon, rising from the mud at Long Point, Lake Erie, in early October.

On the breeding grounds of the West, Pintail have been found nesting on the same island with Mallard, Gadwall, Baldpate, Shoveller, Green-winged, Blue-winged and Cinnamon Teal (Job, 1915).

Voice. The Pintail is a remarkably silent bird, and one may see hundreds coming and going without hearing a sound. The voice is interesting because it has affinities with that of the Mallard, Widgeon and even the Teal. The ordinary call-note of the male is a low and rather musical double whistle, softer than the Widgeon's, and only occasionally heard during winter. It is primarily the courtship note, but is not heard commonly even in the spring. An additional note which I do not recall having ever heard, is described in various ways. It is probably used only in the breeding season and is said to resemble the syllable *proop*, being analogous to the Green-wing's *preep* (Harper, MS.). German writers have also distinguished this note, but they describe it as *krück* or *brüb*, uttered during display (Heinroth, 1911).

The female's note may be heard at any time of the year, although she is a far more silent bird than the Black Duck or Mallard. Her note is a *quack*, usually not so clear and perhaps a bit different from the Mallard's, but at other times indistinguishable from it. This *quack* is used of course in various ways: by the female when leading the young, as an alarm call, as a flocking call at night, etc. Many writers have described also a harsh, rolling note somewhat like the Widgeon's.

The trachea of the male, first described by Latham and Romsey (1798), is about 230 mm. in length, and slightly enlarged at about 25 mm. above the bony labyrinth. The bulb itself is left-sided and, except in size, is not very different from that of the Mallard or Teal.

Food. There is little that is characteristic in the feeding habits of this species, for it closely resembles the Mallard in its diet. The investigations of the U.S.

Biological Survey comprise about all we know of its food in this country. The number of stomachs examined was seven hundred and ninety, collected from practically all over North America between the months of September and March. For the sake of completeness, stomachs of both adults and young taken in the summer months should also be studied. A mere summary of the results of this work (Mabbott,1920) will suffice to show the general nature of the diet. The vegetable matter is 87.1%, chief among which are pond-weeds (28.04%), the seeds being preferred (whereas the Gadwall and the Baldpate prefer the leaves and stems). Among these pond-weeds, seeds of widgeon-grass formed an important item. One stomach contained as many as 2800 seeds of true pond-weeds, and other stomachs over 1000 seeds each. The next most important vegetable food consisted of the seeds of sedges (21.78%), most of which were probably gathered from the water after they had fallen. The remains of grasses, also largely seeds, comprised 9.6%, smart-weeds 4.7%, and various other water plants in lesser amounts. The animal food was only 12.8%, and consisted of mollusks (5.8%), crustaceans (3.8%), and insects (2.8%), besides 0.5% miscellaneous animal food, including a few small fish, a frog, a few marine worms, water-mites, hydroids, corallines (bryozoans), etc.

A summer food mentioned by several collectors in Alaska and northwestern Canada is the horse-tail rush (*Equisetum*). Audubon states that in his time Pintail, as well as other ducks, resorted to the beech woods. Of the Pintail he even says that they take tadpoles in spring, leeches in autumn, and that they have been found eating dead mice. He considered them great insect catchers and figured the bird engaged in snatching insects, a habit also noticed by H. L. Saxby in the Shetland Islands in May. Goss (1891) and others have spoken of their eating acorns, but this diet must be very unusual.

A few young in down from California examined by H. C. Bryant (1914) had eaten storksbill (*Erodium*), other unidentified seeds, and the pupæ of some insects. I think the tendency of most writers on food habits is to exaggerate the uncommon items, that is, the large and easily recognized seeds, fish, frogs, etc. The great mass of the everyday food, which is difficult to analyze, is often scarcely mentioned.

In western Europe the Pintail feeds much more commonly on coastal flats, where it eats *Zostera marina* and shell-fish of various kinds, so that the flesh becomes at times strong and inedible on this account (W. Thompson, 1851; Millais, 1902). In Norway, according to Wallengren (1854), they are known to take blueberries. Stomachs of specimens shot in Germany contained water-bugs (*Dytiscus*), and seeds of pond-weeds, sedges, water smart-weed, lady's thumb, dock-leaved smart-weed, water pepper, dock, and eel-grass. They are also said to visit the stubble fields at times, and Naumann speaks of the seeds of floating manna-grass (*Glyceria fluitans*) as the favorite food in autumn.

Examination of stomachs of birds shot in India, showed that there Pintails feed largely on wild rice and small fresh-water shells (Hume and Marshall, 1879).

In feeding, the Pintail commonly tips up like the Mallard, and it has the same habit of treading up the mud with its feet, after which it thrusts down its head to secure the food thus dislodged. On the White Nile, Abel Chapman (1921) noticed that these and other ducks were feeding in two fathoms of water. So saturated is this river with floating vegetation that plenty of food could be obtained in deep water either by tipping up or "tugging and guzzling" on drift-weed and floatage.

Courtship and Nesting. As already noted (under Migration) Pintails arrive very early on the breeding grounds. They probably pair at least as early as the Mallard. The display of the Pintail was well described more than a century ago by George Montagu (1813). It has been described many times since, and has been beautifully illustrated by Millais (1902). It consists in the uprearing attitude seen in the Mallard and Common Teal. To be more specific: one or several males suddenly bend the neck sharply, elevate the tail and rear up in the water, at the same time thrusting the bill down almost to the water. During courtship the male utters the whistling note; but another note used during display is described by C. W. Townsend (1920) as a soft *wat-wat*, and is evidently quite Teal-like. This is the same note described in various ways, as *prōōp*, *krück*, *brüt*, etc. The female utters a low *quack*, sometimes resembling the *croak* of the Widgeon (Millais, 1902).

The mating flight seems to have been first noted by Nelson (1887) during his Alaskan journeys. It is the same as that of Mallard, Widgeon, Gadwall and Teal. Harper (MS.) first saw these pursuit flights on June 4, 1920, in the Athabaska region, though the birds had arrived on their breeding grounds at the end of April and the beginning of May. One female was followed by three males and at times she made a sort of "fluttering pause" in her flight, perhaps "when the male of her choice came near." Then she would go off on a new tack, as if desiring that this male should follow, and the others desist from the pursuit. Dr. Nelson (1887) witnessed a flight in which six males were engaged, and he distinguished a clattering noise which sounded "like a watchman's rattle," and which was audible from a long distance. Is it not possible that the "fluttering pause" noticed by Harper is the cause of this peculiar rattle, which is probably not due to actual contact between the wings, and may be analogous to the "fluttering" sound heard from Widgeon in ordinary flight? These rattling noises, so commonly heard during the pursuit flights of the Chiloë Widgeon, may then be explained by the quick "braking" of the bird in flight rather than by any clashing of wings.

These pursuit flights may last for as much as half an hour, until perhaps only one male remains with the female. At another time Dr. Nelson saw the female plunge under water at full speed, followed by her pursuers, after which they all suddenly

took wing again a few yards beyond. At this season they also have a habit of descending from a great altitude at an angle of about 45 degrees, with their wings stiffly outspread and slightly decurved. They are frequently so high that he has "heard the noise produced by their passage through the air for fifteen or twenty seconds before the birds came into sight. They descend with meteor-like swiftness, until within a few yards of the ground, when a slight change in the position of the wings sends the bird gliding away close to the ground for a hundred or three hundred yards without a single wing-stroke" (Nelson, 1887).

It seems unnecessary to list here the hundreds of available nesting dates, for these are only of comparative value. The laying period is perhaps a week later than that of the Mallard, and considerably earlier than that of the Gadwall, Widgeon, Blue-winged Teal and Garganey. In California, the southernmost breeding area in the New World, they begin laying late in April or early May, most clutches being complete by May 20 (Grinnell, Bryant and Storer, 1918). In North Dakota and southern Saskatchewan most clutches are full from early to late May, and most young are hatched early in June (Bent, 1901–02; Ferry, 1910). In the Athabasca region, during the retarded season of 1920, males began to flock together by June 12, indicating that some females were incubating. Nests were found as late as the end of the month (Harper, MS.). In western Alaska the breeding season is naturally somewhat earlier, as early perhaps as middle to late May, but on the Arctic coast it is not at its height till the end of June.

On Bering Island eggs are laid in late May (Bianchi, 1909), on the Wiljui eggs were taken June 18 (Maak, 1859), while on the lower Jana eggs were found early in June (von Bunge and von Toll, 1887). On the lower Petchora the first eggs were found on June 5 (Seebohm, 1885). In central Europe the laying period begins as early as the middle of April and extends through May, but in Finland June is the more usual month (Naumann, 1896–1905). Nesting in Scotland begins in the middle of May and probably extends through June. Laying takes place from the middle of May till the beginning of June in Iceland (Hantzsch, 1905).

The nesting site is very similar to that chosen by other surface-feeding ducks. On our own prairies they sometimes select dry places as much as a mile from the nearest slough (Job, 1902; Rockwell, 1911). Bent (1901–02) found them more commonly in the vicinity of larger lakes. They are not particular about the location, and often nest near railroads and highways. One was found only eighteen feet from the main line of the Burlington Railroad in Colorado (Rockwell, 1911). They are so often placed at a distance from swamps that many are destroyed by mowing machines and they are often flooded out by irrigation dams, if they are placed too low. As many as ten or fifteen pairs have been found nesting in an area of eighty acres.

There is nothing distinctive about the nest itself. The clutch averages somewhat less than that of the Mallard, numbering from five to twelve, ordinarily about eight.

Second clutches may contain only four eggs. The eggs are slightly smaller and more elongated than those of the Mallard. In color they vary from buff to pale olive green, apparently never clear greenish like many Mallard eggs, but they cannot always be distinguished from those of the latter. They measure from 52-61 by 36-42 mm., the average being 55 by 38 mm. The nest-down is blackish, black, brown or sepia, with large white centers (A. C. Jackson, 1918). The incubation period lasts from twenty-three to twenty-five days (W. Evans, 1891; Hantzsch, 1905; *et al.*).

The gathering of the males in considerable flocks as soon as the females begin to incubate is characteristic of this species. In some localities, as for instance on the Bear River Marshes, Utah, males come in from the surrounding country, so that on June 14 Wetmore (1921) noted a body of from 2500 to 3000 Pintails, all males. As in some other northern ducks, a few rare cases of the drake remaining with the female until after the young have been hatched, have been recorded (Naumann, 1896–1905; Hantzsch, 1905).

The eclipse plumage is assumed by the male in late June and early July. Harper (MS.) found a male which had moulted all the primaries by July 2, and another in partial eclipse June 28, but these must be exceptionally early dates for a place so far north.

Status. Almost everywhere in America, except in eastern Canada and the New England States, this duck ranks first or second in abundance. I doubt whether the shooting records give a true picture of the comparative abundance, for the following reasons: the shooting season at Lake Erie, for instance, begins too late to take in the whole migration of such an early duck, and even when it is abundant, sportsmen often prefer to shoot the larger marsh ducks or the diving ducks. On its southern feeding grounds, where it spends the whole winter, it becomes so shy and gathers into such flocks that, in comparison with its numbers, it suffers perhaps less than any species of shoal-water duck. I think this duck has profited more than any other in America from increased protection and the closing of markets.

At Long Point, Lake Erie, between the years 1887 and 1920, out of 156,112 ducks shot, 37,950 (25%) were Pintails. In some years it is second in abundance there, being greatly exceeded by the Black Duck only. During the period under discussion there seems to have been a falling off since about 1901, which was one of the highest years, with a total of 2628 Pintail. Other years just as high were those of 1891 and 1893.

At the Monroe Marsh Club, Lake Erie, the Pintail, for some reason or other, is exceeded in numbers by the Mallard, Canvas-back, Red-head, Blue-bill (Scaup, species?), Baldpate, Blue-winged Teal and Green-winged Teal. In the years 1885 to 1901, only 2809 Pintail were taken in a total of 40,615, but this is very likely to be a matter of sportsman's preference.

An idea of its extreme scarcity in central New England may be obtained from my twenty years' observations at Wenham Lake, where only 29 were taken between the years 1899 and 1920, and only 84 seen and not taken, a proportion of 0.01% of all ducks shot. Of course a few Pintail reach New England with the Blue-wings in early September, and so escape my records, which usually begin about September 25 each year. In southern New England it is a little commoner.

Going southwest, the Pintail first appears regularly in some numbers in Delaware Bay and southward along the entire coast. At Currituck Sound, North Carolina, it is exceedingly numerous, but owing to its cleverness it appears on the shooting records of the Currituck Club (1888–1910) as only 6544 out of a total of 65,482, being greatly exceeded by the Mallard, Black Duck and American Widgeon. In the following years, 1911–18, Pintails were exceeded by the Mallard and Black Duck. They numbered 1973 in a total of 19,515. There is no certain indication of any falling off in this period, the lowest shooting seasons being 1897–98 and 1898–99. At the Swan Island Club, a few miles off, Pintails were second in number only to the Black Duck during the seasons 1909–10 to 1918–19. In some seasons they actually exceeded every other species. At the Santee Club, South Carolina, between the years 1901 and 1909, only 847 Pintail were taken in a total of 22,084 ducks. This seems to show that the birds are not so fond of the abandoned rice-field districts as of the broader sounds farther north. But on the east coast of Florida (Canaveral Club) they make up 14% of the ducks shot there.

The figures for the markets of New Orleans in the season 1913–14 show 27,955 Pintails out of a total of 283,483 ducks, or 13%. They were exceeded there by the Mallard, Shoveller, Teal (of two species) and Blue-bills (mostly Lesser Scaup). In the Rio Grande Valley in the autumn the Pintail is the third in order of abundance among the ducks, averaging about 12% of the total (Leopold, 1919). In California it is also one of the most abundant ducks. At the Empire Gun Club (Monterey County) between 1905 and 1913 the species was for three years first in order of abundance. Of the 71,793 ducks received by the American Game Transfer Company at San Francisco in the year 1910–11, the Pintail numbered 17,432, being exceeded only by Teal of two species. The Hunters Game Transfer Company in the seasons 1907 to 1910–11 inclusive, handled 81,656 Pintails out of a total of 357,114 ducks. The Pintail was by far the most numerous, and was exceeded only by the Green-winged and Cinnamon Teal, which were unfortunately lumped together in the records. In the season 1910–11, the combined figures of five other companies show that the Pintail represented 22% of all the ducks (Grinnell, Bryant and Storer, 1918). Dr. Grinnell suggests that the species cannot continue to exist in numbers, but it seems to me more likely to maintain at least its *relative* status than any other species.

The report of the Minnesota Game Commission shows the Pintail fourth in abundance in 1919 and sixth in abundance among the ducks in 1920. It is greatly

exceeded there by several other species. Next to the Mallard and Lesser Scaup it is the commonest migrant in the Kansas City region (H. Harris, 1919).

A great increase has been noted in the numbers now regularly breeding in our north-central States. Twenty or thirty years ago Hollister (1919) notes that in southeastern Wisconsin only Carolina Ducks were killed at the opening of the season, September 1. Now, Pintails regularly nest there, and fully fifty were reared on one pond. In North Dakota, Bent (1901 02) found this species the most abundant breeding duck, and as I recall, it is second only to the Blue-winged Teal on the plains of Montana early in September. As a breeder and early migrant in the Athabasca Delta the Pintail seems to rank only fourth, being exceeded by the Mallard, Golden-eye and Lesser Scaup (Harper, MS.). In the region about St. Michael's, Alaska, it outnumbers all other ducks in the early autumn, perhaps even equaling all other ducks combined (Bishop, 1900; F. S. Hersey, 1917). Although it seems to be a rather rare bird along the Arctic coast of Alaska, this and the Long-tailed Duck are the commonest ducks on the Anderson River (MacFarlane, 1908).

The ability of the Pintail to avoid the decoys of western Europe has become proverbial. Out of 95,836 ducks taken in the Ashby Decoy (Lincolnshire) between the years 1833 and 1868, only 278 were Pintails, and proportions like this, or an even greater discrepancy, are characteristic of all decoys where records have been kept.

Although Millais (1902) considered it a rapidly increasing breeder in Scotland, recent writers describe the increase as exceedingly slow, and not to be compared to that of the Widgeon or the Shoveller (Baxter and Rintoul, 1921). It was first found nesting in Scotland at Loch Leven in 1898. As a winter visitor in the British Isles its status does not seem to have materially changed.

Its status throughout the Palæarctic region is probably very similar to that in the Nearctic. Seebohm (1880a) noted it as the commonest duck at the mouth of the Petchora in the breeding season, but exact information for this enormous region is so fragmentary that generalizations are impossible.

Enemies. The ordinary enemies of the Pintail apparently differ in no way from those of the Mallard. H. C. Bryant (1914) found a great destruction of eggs during his survey of the breeding grounds in California and Oregon. But the percentage of nests destroyed after they had been found by him was probably much greater than among undisturbed nests. This is so true of the nests of our Ruffed Grouse that I think it must hold for other ground-nesting birds as well. The worst enemy in the tule-swamp regions of the Southwest seems to be the racoon. At Barr Lake, Colorado, a bull snake three feet nine inches long was found in a Pintail's nest with an egg in its mouth. The observer was fortunate enough to get a photograph of the reptile before it disgorged the egg (Rockwell, 1911).

On a low rocky islet in Lake Athabasca, Harper (MS.) found a Pintail's nest close

to a nesting colony of about one hundred Ring-billed Gulls and a few Herring Gulls, which shows that not all gulls are egg-thieves.

DAMAGE. Owing to its habit of early migration the Pintail arrives among the rice-fields of central California and Arkansas in some numbers before the grain is harvested, at least in those seasons when the crop matures late. What damage is done by ducks in these areas is probably chargeable chiefly to this species.

FOOD VALUE. Audubon seems to have held a rather low opinion of the Pintail's flesh. Nevertheless it compares fairly well with that of several other species when killed in regions well stocked with suitable food. I think it is apt to be thin, and it certainly seldom takes on the layer of fat which makes the Widgeon so delicious. In the British Isles, and in fact throughout western Europe it is at times quite "fishy" in flavor — sometimes simply uneatable. In India it seems to rank high. Hume and Marshall (1879) class it next to the Mallard, and say they have never come across one with a fishy taste.

HUNT. In general the same methods used in hunting the Mallard are employed in taking the Pintail. A good account of the primitive methods, including poisoning, liming and netting, may be found in MacPherson (1897). A curious method of taking Pintail and other ducks in eastern Siberia is described by Radde (1863). It consists of baiting eel-hooks with pieces of sheep's lung, which float on the water and are much relished by Pintails when they come to feed at night. In the morning the birds can often be drawn in alive.

Flight-nets made of fine, tough, bamboo fiber seem to be still in use in the Canton region of China. In the winter live Pintails sell there as low as 3½ pence apiece (Vaughan and Jones, 1913), and dead ones for even less.

BEHAVIOR IN CAPTIVITY. Always a favorite with bird-lovers, the Pintail gets along well with other ducks, is hardy, long-lived, and perhaps the easiest to rear in captivity excepting only the Mallard. This of course does not mean that it nests regularly or freely in confinement unless the stock itself is hand-reared. It is unnecessary to mention in detail the many public gardens and private grounds where it has been successfully bred. In the London Gardens it has nested from an early period, the hatching dates falling chiefly between the middle of May and the middle of June (P. L. Sclater, 1880). Twenty-one specimens kept there lived on the average four years and seven months, the maximum being seventeen years and ten months (P. C. Mitchell, 1911). Periods almost as long have been recorded by Schmidt (1878).

Shoal-water ducks often develop the habit of diving in captivity. To this the

Pintail is no exception. Pinioned birds not only dive readily when pursued, but they have been seen diving of their own accord as many as ten or fifteen times in four feet of water (Naumann, 1896 1905; Christy, 1916; Moore, *fide* Baird, Brewer and Ridgway, 1884).

Assumption of male plumage by old females has been noticed in captive Pintails. Such females seem to go back to their normal plumage in summer (Rogeron, 1903).

The ease with which male Pintails can be crossed with female Mallards has been taken advantage of by certain English sportsmen. A stock of three-quarters and seven-eighths Pintail has been developed at Netherby by Sir Richard Graham, and though they have not become regular breeders, they have in the spring and autumn returned to the ponds where they were reared (Millais, 1913).

Pintails nested for me at Wenham, Massachusetts, and I also raised a number of first and second generation hybrids with the Mallard in connection with work in genetics. I can recommend these hybrids as excellent material from the sportsman's point of view, for they soon became wild enough to make difficult targets, and their flesh is excellent. Plenty of fertile eggs can be obtained by turning down a number of semi-domestic female Mallards in a pond with the same number of Pintail males.

HYBRIDS. Wild hybrids between this species and the Mallard are more common in this country than any other duck-hybrids excepting the Mallard-Black Duck crosses. In the Old World they are easily the commonest among wild hybrids, and they are so numerous that to list them is quite superfluous. Additional wild hybrids are listed by Suchetet (1896) between the Pintail and *Anas penelope*, *Anas crecca*, *Anas strepera*, *Spatula clypeata*, *Nyroca ferina*. In confinement the Pintail has been crossed with very many other ducks, including the Chilian Pintail (*Anas spinicauda*), the Red-crested Pochard (*Nyroca rufina*), the Rosy-billed Duck (*Metopiana peposaca*) and the Garganey (*Anas querquedula*) (Poll, 1911; Earl Grey, *in litt.*; specimens in Tring Museum).

GEOGRAPHICAL RACES

ANAS ACUTA ACUTA LINNÉ

CHARACTERS: Size slightly smaller; middle tail-feathers shorter. Wing of adult male up to 280 mm.

RANGE: Europe and Asia.

ANAS ACUTA TZITZIHOA VIEILLOT

Anas tzitzihoa Vieillot, Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 163, 1816.
Anas acuta americana Reichenow (*nec* Gmelin), Ornith. Monatsber., vol. 9, p. 17, 1901.
Dafila acuta tzitzihoa Thayer and Bangs, Auk, vol. 33, p. 46, 1916.

CHARACTERS: Size slightly larger, and middle tail-feathers longer. Wing of adult male up to 285 mm.

RANGE: New World.

CHILIAN PINTAIL

ANAS SPINICAUDA VIEILLOT

(Plate 40)

SYNONYMY

Anas spinicauda Vieillot, Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 135, 1816.

Anas oxyura Meyen (*ex* Lichtenstein, MS.), Nova Acta Acad. Leop.-Carol., Halle, vol. 16, suppl., vol. 1, p. 122, 1834.

Erismatura spinicauda G. R. Gray, Genera of Birds, vol. 3, p. 627, 1844.

Dafila oxyura Reichenbach, Synopsis Avium, Natatores, pl. 88, fig. 920-921, 1845.

Dafila spinicauda Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.

Dafila urophasianus P. L. Sclater (*nec* Vigors), Proc. Zool. Soc. London, 1860, p. 389.

Anas (*Dafila*) *caudacuta* Burmeister (*nec* Pallas), Journ. f. Ornith., vol. 8, p. 266, 1860.

Dafila caudacuta G. R. Gray, Hand-list Birds, vol. 3, p. 81, 1871.

VERNACULAR NAMES

English: Chilian Pintail, Brown Pintail, South American Pintail.

German: Chilenische Spiessente, Südamerikanische Spiessente.

French: Canard spinicaude.

Dutch: Bruine Putstaart Eende.

Spanish: Pato jergon, Pato jergon grande, Pato comun, Pato del campo, Pato maicero, Barcino, Papsa — (Bolivians of Tarapaca), Pato barcino.

DESCRIPTION

ADULT MALE: Superficially resembles the female of the Common Pintail, *Anas acuta*, but the edges of the feathers of the mantle and scapulars are margined with brown rather than gray. The tertials are longer and blacker and ornamented down the center with a black stripe. The top of the head is browner, and the chin, throat and neck are much whiter. The speculum is black with a greenish gloss, and is framed both in front and behind with a buffy wing-bar. The central tail-feathers are long and pointed.

Iris brown. Bill yellow with a black stripe down the center of the culmen. Legs and feet grayish to olive gray.

Wing 230–260 mm.; bill 42; tarsus 42.

ADULT FEMALE: Similar to male, but the speculum is always dull brownish to blackish, with a darker band just inside the posterior white bar. The color of the speculum varies a good deal. A large series of this duck in the Brewster-Sanford collection in New York shows that there is another difference in the sexes: the females are much whiter and more unspotted on the lower breast and abdomen than are the males and the central tail-feathers are not so long.

Color of soft parts the same as in male.
Wing 212–240 mm.; bill 40; tarsus 40.

YOUNG IN FIRST (JUVENAL) PLUMAGE: Like the female, but the top of the head lacks the rich chestnut color of the adult, and the chin and throat are grayish, with very minute spots. The whole under surface is much grayer than in the adult and indistinctly streaked, with no spotting, even on the breast. The upper surface is very nearly the same, but the tail-feathers are blunted and the long central ones poorly developed. Bill much straighter in profile along the culmen and less "dished" than in the adult.

YOUNG IN DOWN: Darker over whole upper side than the young of the Common Pintail, *Anas acuta*, the color being dark brown to jet black instead of a medium tinge of brown. Lower side almost pure white as contrasted with the dirty or grayish white of the Pintail. The body- and face-pattern is about the same as in the Pintail as near as can be determined from the small series taken by Mr. J. L. Peters in the Rio Negro Province of Argentina.

REMARKS: Immature specimens at four or six weeks of age are not to be differentiated from the northern Pintail at the same stages of growth.

DISTRIBUTION

THE Chilian Pintail is the commonest duck of South America, and it has one of the largest distributions. An examination of seasonal dates shows that it is essentially a non-migratory species, excepting at the northern and southern extremities of its range, while in the Andean regions its migration is probably vertical rather than north and south.

In the north its regular range extends in the Andes as far as central Peru, though it is said to occur occasionally even in Dutch Guiana (F. P. and A. P. Penard, 1908–10) and perhaps in British Guiana (C. B. Dawson, 1916). There are numerous records for the lakes and rivers of the Peruvian Andes. The Brewster-Sanford collection (American Museum of Natural History) possesses a series of seventeen specimens taken at Junin at an altitude of 12,900 feet in March, and some of these birds were evidently breeding. Taczanowski (1886) has also recorded it from Junin and Rumucucha, while specimens were taken by Whitely (British Museum) at Tinta, the Laguna de Tangasuca and the Laguna de Langui. Von Berlepsch and Stolzmann (1906) have recorded specimens taken in the Province of Puno in December, and others have been taken in the same month at Lake Titicaca (*circa* 11,500 feet) according to Menegaux (1909a). **Peru**

In Bolivia this Pintail seems to be confined to the Andean region. Von Boeck (1884) has recorded it from Cochabamba, and Menegaux (1910) has listed two specimens taken in June (!) on the Rio Pazna which flows into Lake Poopo. **Bolivia**

Paraguay is a country poorly explored ornithologically. The Pintail has been found there, near Fortin Donovan in the Chaco by Kerr (1892) and H. von Ihering (1904) says it occurs there, but it is probably not a common bird. **Paraguay**

In Brazil the species occurs only in the southeastern parts. Von Pelzeln (1868–71) has recorded it from Itarare, and H. and R. von Ihering (1907) say that specimens have been taken in São Paulo and Rio Grande do Sul. In the latter Province it ought to be quite common, for it is said to be the commonest duck in Uruguay (Aplin, 1894). Barrows (1884) met with it at Concepcion in June, and the Berlin Museum has specimens from Montevideo and Canelones (von Pelzeln, 1868–71). According to Tremoleras (1920) it has also been recorded from Rocha. **Brazil** **Uruguay**

Undoubtedly the great center of concentration for this Pintail is the Argentine Republic. In the

more northern districts it is not a common bird, although it has been recorded from practically every

Argentina Province: from eastern Jujuy, February (Bruch, 1904), from Tucuman (Lillo, 1902), from Rioja, March to May (Koslowsky, 1895; Giacomelli, 1907), from Mendoza (H. Burmeister, 1860; Reed, 1916), from Cordoba (Dabbene, 1910) and from the district north of Entre Rios, where it is said to breed (Dabbene, 1910). Farther south it becomes very abundant, occurring in great numbers, especially in the Province of Buenos Aires where it is both resident and migratory (A. H. Holland, 1892; Hartert and Venturi, 1909; C. H. B. Grant, 1911; E. Gibson, 1920; Wetmore, *in litt.*). Farther south still, in the Provinces of Rio Negro and Chubut it is equally common and breeds (Durnford, 1877, 1878a; Doering, 1881; P. L. Sclater and Hudson, 1889). According to Scott and Sharpe (1912) it is found at all seasons, and nests, even in southern Patagonia; but on the Straits of Magellan it is probably largely a summer resident. Salvadori (1900a) has, however, recorded a specimen taken at Punta Arenas in May, and the Brewster-Sanford collection (American Museum of Natural History) possesses another taken in the Straits in July!

Tierra del Fuego It does not winter in Tierra del Fuego, but in summer it is the commonest duck and breeds (Crawshay, 1907). Blaauw (1916a) met with a small number at Estancia Sarita.

In the Falklands the Brown Pintail is not by any means a common species. Abbott (1861) took a

Falkland Islands few specimens in East Falkland, where he says it is resident. The Brewster-Sanford collection also has a few specimens taken in late December in these islands, but W. S. Brooks (1917) did not meet with it.

This is the commonest duck in Chile and is found throughout the country (Schalow, 1898; Lane, 1897). I doubt whether it winters in the southern parts, but it is exceedingly common in the central

Chile Provinces (Quijada, 1910). It has been reported specifically from Lago Todos los Santos (Blaauw, 1916a), Ancud (American Museum specimen), Rio Bueno in January, and Corral in February (British Museum), Colchagua (Lataste, 1893), Penaflores, January to March (Lataste, 1895), Valparaiso (von Pelzeln, 1868–71), Ovalle in October (Schalow, 1898), Antofagasta (Philippi, 1888) and Tarapaca, where it is said to be the commonest duck and breeding (Lane, 1897).

GENERAL HABITS

HAUNTS. This southern representative of our Common Pintail is very similar in its general conformation, habits and life-history. The nature of its country, however, is so different from that of the northern regions that its times of arrival and departure are extremely irregular and adapted to regions of spasmodic rainfall and well-tempered winters. It is the only duck of southern South America that exists in really enormous numbers, and no doubt it numerically exceeds all other species combined.

It ranges everywhere from coast to coast wherever suitable shallow waterways occur, and it has even been known to feed in coastal regions in eastern Patagonia. It is, however, a strictly fresh-water species. On the elevated Andean plateaus it is found on the swampy prairies up to 12,000 feet in northern Chile, and still higher in Peru. There is no geographic race occurring on this plateau, and it is safe to say that the bird is not completely sedentary there, but moves in a more or less irregular vertical migration (Lane, 1897). In the central part of its range, in the Province of Buenos Aires, it is common throughout the year, but is probably more abundant in the autumn (E. Gibson, 1920). Still, Wetmore (MS.) saw enormous numbers come into this region early in November, after the breeding season, and it is evident that

MAP 58. Distribution of Chilian Pintail (*Anas spinicauda*)

great numbers may congregate at any time or in any place where the water level is suitable.

Wariness. Even at the present time the Brown Pintail seems to be less wary than its northern relative. But it is far from being a stupid duck. E. Gibson (1920) describes it as neither stupidly confiding nor wildly shy. During a great northern movement of male birds in early November, 1920, Wetmore (MS.) writes me that enormous numbers passed over him within sixty yards, and showed little fear if he merely crouched on the ground. In northwestern Patagonia Peters (MS.) found it moderately wild, rather difficult to approach, and quick to discover some one lying in wait, and this in spite of the fact that it was very little hunted there.

On their breeding grounds in Tierra del Fuego they must be fairly confiding, judging from Crawshay's (1907) statement that they come back again and again over the head of the traveler, even when they have been shot at several times.

Dr. Wetmore (MS.) says that they impressed him as alert and intelligent, and eminently well able to take care of themselves. In wilder sections where not molested they exhibited little fear, but where hunted it was often almost impossible to come within range of them, especially on open pampa where there was little or no opportunity for concealment.

Daily Movements. Hudson speaks of them as coming from the river to feed by night in the grain-fields of Patagonia (P. L. Sclater and Hudson, 1889).

Gait, Swimming, Diving. Both on land and on water this bird is very graceful in appearance, and entirely like our own Pintail in posture and movements. It feeds by immersing the head and neck, or by tipping up in deeper water. Mr. Peters (MS.) once saw a single specimen (sex?) repeatedly dive in deep water, but he says probably not one in 10,000 ever feeds in this way. The young he found diving actively when disturbed, using their wings only under water, and "popping to the surface like rubber balls after a few seconds' submergence."

Flight. On the wing this bird resembles its northern relative, but it appears somewhat heavier and thicker in the neck. Though the sexes are so similar in plumage the female may often be distinguished in flight by the shorter, less pointed tail, especially when the flocks swerve in passing overheard.

It is an extremely gregarious duck, gathering in tremendous flocks, especially in winter. E. Gibson (1920) says he has seen aggregations numbering up to a thousand birds. In the great flight of males witnessed by Wetmore (MS.) they passed in flocks of from six to a hundred, the larger companies traveling in irregular lines, the birds more or less abreast and flying steadily northward at a height of from thirty

to sixty yards. It is therefore evident that the typical wavy-line form assumed by all our northern ducks during migration is also common to this species.

On the mountain plateaus large companies seem to be rare; groups or family parties up to eight are characteristic (Taczanowksi, 1886).

Association with other Species. This Pintail is sociable, as well as gregarious. It will mingle rather freely with any or all ducks and Teal of the Argentine. Flocks composed equally of Pintail and Fulvous Tree Ducks, with a sprinkling of Rosy-bills, have been seen (E. Gibson, 1920).

Voice. Like other Pintails this is an extremely quiet bird. Indeed, Captain Abbott (1861), writing of the Falkland Islands, says he never heard any note from them. Mr. Peters (MS.), who saw this species constantly through the breeding season in northwestern Patagonia, never heard the whistle characteristic of the male. I cannot say that I ever heard any sound from a captive pair which I kept. However, the call of the male resembles, and perhaps is exactly the same as that of the northern Pintail. Wetmore (MS.) describes it as a "mellow, trilled whistle, a purling sound pleasing to the ear," and given frequently by parties of males on the wing. An apparently distinct note, probably used only in the breeding season, and presumably the same as the Teal-like *proop* heard from the Common Pintail on the breeding grounds, was noted by Peters (MS.), who describes it as a *krück*.

The female's note is a low *ka-ack* or *qua-ack* slightly lower in tone than that of our Common Pintail (Wetmore, MS.).

The trachea of the male is 180 mm. in length and uniform in size. The bulb is small, left-sided, roughly globular in shape, and measures 15 by 11 mm. The trachea of the female is simple, as in other ducks.

Food. The Brown Pintail feeds almost anywhere, but it is particularly fond of rising waters which in flooding areas of muddy flats bring up windrows of seeds and dead or drowning insects. The seed of the giant thistle (*Carduus mariana*) which ripens on the pampa from January to April is spoken of by several writers as being a favorite food (P. L. Sclater and Hudson, 1889; C. H. B. Grant, 1911; E. Gibson, 1920). They are often seen on open, dry land. Durnford (1877) found large flocks spending their time on the mussel-beds at the mouth of the Chubut. Their habit of feeding on ripe Indian corn when the cobs are collected in heaps has also been referred to by various observers (P. L. Sclater and Hudson, 1889; E. Gibson, 1920).

A series of seventeen stomachs collected by Mr. J. L. Peters at Huanuluan, Rio Negro Province, between August and January, and kindly analyzed by Mr. W. L. McAtee of the U.S. Biological Survey, gives a very good idea of the important duck foods of this particular region. The proportion of vegetable matter ranged from

28 to 100% and averaged 86%. It consisted chiefly of the seeds of *Myriophyllum* (water milfoil), *Rumex* (dock) and *Carex* (sedge) with remains of *Batrachium* (water crowfoot) seeds in a few cases. There were also shreds of grass-glumes, unidentified seeds and vegetable débris. The favorite food appeared to be the seeds of the water milfoil, which were present in all stomachs up to as many as 600.

The animal matter was mostly unimportant and would probably be even less so in the winter season. It consisted of stratiomyiid larvæ (flies), remains of Corixidæ (bugs), snails, caddis cases and larvæ, dragon-fly nymphs, dytiscid larvæ (water-bugs), the jaw of a cricket and traces of a mollusk shell.

Courtship and Nesting. The pairing season is irregular, though generally earlier than that of other ducks. In northwestern Patagonia pairing had certainly begun late in August, although flocks were still in evidence. Specimens shot on September 6 showed only slight traces of sexual activity and were completing a prenuptial moult. A week later a male with fully developed sex glands was taken (Peters, MS.). The only live pair which I ever kept showed no courtship activity of any sort, and neither Peters nor Wetmore (MS.), on recent journeys to South America, observed any display in the field. The reason for this is not clear. A characteristic mating flight was, however, seen by Wetmore, near Lavalle (Province of Buenos Aires). A pair circled over a flooded meadow, high in the air, the male at short intervals swinging under and slightly in front of the female, while she at each approach swerved to one side or the other, leaving the male again behind. In other words this exhibition seems to be exactly the same as in the Common Pintail.

In southern Patagonia and Tierra del Fuego the nesting season begins about the middle of October and is over by December. In northwestern Patagonia it is somewhat earlier. Peters (MS.) found the first nest on September 24 and he thinks laying had commenced even earlier. In the last of September and early October nests could be found almost daily. The latest clutch found was on December 4; the six eggs were ready to hatch. It is noteworthy that even through the height of the breeding season small flocks of non-nesting birds are commonly seen. Peters collected some such on November 3 and 11, and even on November 29 females were shot that had not moulted the previous season's primaries or tail-feathers. From March 3 to 8, long after the breeding season was past, occasional pairs, which for some reason had not bred, were seen in the Province of Buenos Aires (Wetmore, MS.).

In this Province the earliest breeding seems to be in late September (Beck, MS.). E. Gibson's (1920) earliest nest was on October 3, and his latest on November 30. Still farther north the season is undoubtedly even more irregular and extended. On the great plateaus of Chile and Peru the nesting-time is also very irregular. According to Lane (1897) it extends from October to February in northern Chile. Out of nine males taken by Beck (Brewster-Sanford collection) near Lake Junin, Peru,

in March, the sex organs were small in seven, "large" in one, and in "breeding condition" in one. Of eight females taken at the same time in the same place, one was just through nesting in late March, two were actually nesting, one had the organs apparently ready to breed, two had the ovaries "swelling," and the remaining two had the sex glands "small."

Not only is the season irregular, but the locality chosen varies from year to year. At Cape San Antonio, E. Gibson (1920) never saw a nest in twenty-five years; and then in 1898 the species suddenly became an abundant breeder, and after that there followed another gap till 1904, when nests again became very numerous. The mere presence of much water and rank herbage does not necessarily result in nesting.

The nest is always on the ground in various situations, some in long grass in pampas bottoms, others on higher ground, often among thistles and sometimes on islands in swamps. Nests within a few yards of each other have been found by E. Gibson (1920). The clutch seems to be the same as in the Common Pintail, although some writers give the impression that clutches of from four to six are common. In northwestern Patagonia eleven clutches taken by Peters averaged eight each, and E. Gibson (1920) says clutches generally consist of eight or nine, and that he has seen ten or eleven and even twelve. The eggs are cream-colored, somewhat variable in shape and average 52 by 40 mm. The incubation period is not known, but it is probably the same as in *Anas acuta*. In confinement clutches hatched in twenty-four days (Wormald, *in litt.*).

The exact time when the males leave the females is not certain, but that they do leave about the time the clutch is completed, is now beyond question from the observations of Mr. Peters (MS.) on the breeding grounds and of Dr. Wetmore (MS.), who on November 6–8 witnessed an astonishing flight consisting almost entirely of old males. It is clear that these males, still in fresh plumage and sexually active, had left the breeding grounds, probably farther south, and were seeking a summering ground or a moulting ground, in exactly the same manner as their northern cousins. This summer excursion began on November 6, on the coast fifteen miles south of Cape San Antonio, following a severe storm which flooded large areas and killed many thousands of sheep. On the evening of the 7th the flight greatly increased, the larger flocks traveling abreast as if on true migration. On the following morning the movement lasted until ten o'clock, and between five o'clock and noon the total number seen was estimated by Dr. Wetmore at from 15,000 to 20,000!

The female on the nest or when leading young behaves in exactly the same way as any of the northern ducks, employing various ruses to divert the attention of the intruder and lead him from the concealed treasures.

Status. The extraordinary numbers of these ducks have aroused the interest of naturalists and the enthusiasm of sportsmen. Of the eleven kinds of ducks

observed by Peters (MS.) in Rio Negro Province, the present species comprised, in his estimate, from 80–85% of the whole. Whether this proportion holds for other districts it is hard to say, for this duck comes and goes so irregularly. But taking the open country of Argentina and Chile as a whole, this is undoubtedly the commonest duck, probably greatly outnumbering all other species put together. Only in recent years has it been subject to systematic slaughter, for the old-time *gauchos* were contemptuous of everything but beef and mutton; fish and birds were beneath their notice (E. Gibson, 1920). The shepherds of foreign nationalities, Spaniards, Basques, Italians, French and Scandinavians, do not altogether share this prejudice, but dislike the cooking trouble involved (E. Gibson, 1920). But now the bird is hunted hard, especially in the eastern districts, and large numbers are sold in the markets of Buenos Aires (Wetmore, MS.). Its future is problematical. The game-laws, so I am told, are excellent, but practically no attempt is made to enforce them, and most officials are easily silenced by a small gift. Where land is held in large blocks, many owners forbid shooting, and protect the birds for their own sport; so until the large *estancias* are broken up, it is reasonable to suppose that the species will continue to prosper.

Enemies. Natural enemies of ducks seem to be very few in the pampas regions, and not at all serious. The subject has been discussed under the Chiloë Widgeon.

Damage. The older writers, notably Hudson, speak of the damage caused by these birds in the corn-fields as really serious. They are described as coming to the maize-fields with pigeons and Upland Geese, and feeding on the corn-cobs after these have been gathered in heaps. E. Gibson (1920) has shot specimens whose crops burst on striking the ground, and which contained more than a large handful of grain.

Food Value. The flesh is everywhere excellent, and the species is one of the principal game-birds of the Argentine.

Hunt. In Durnford's (1877) time the colonists still trapped them at night when they came to feed in the wheat-fields of Chubut. In Hudson's day they were shy enough on the open pampa so that trained horses were used. Behind these the hunter would advance as the horse grazed slowly on. So thickly do these birds gather that great shots have been made even with moderate-sized guns. P. L. Sclater and Hudson (1889) speak of sixty having been taken at one shot, and E. Gibson (1920) also speaks of large shots — sixty-four with two barrels of an ordinary shoulder-gun — made on his place. He tells of a guest whose spoil required the services of a cart and two horses to be brought back to the ranch house, and this enormous bag was obtained by one gun in one day, taking wing shots only.

Behavior in Captivity. This Pintail was imported into England at an early date by Lord Derby, and the London Gardens obtained their first specimen in 1851, when the Knowsley collection was sold. Others were imported in 1870 and beginning with 1872 this duck bred very freely in the Gardens, so that many Continental collections were supplied from there (P. L. Sclater, 1880). It is classed as one of the easier species to breed, and many amateurs have successfully reared it. It has always been a rather cheap bird, varying from £2 to £3 the pair. At the present time hand-reared stock brings 80 or 90 shillings a pair in England. There is an old note by Dufort (1876) to the effect that a pair kept by M. Bouillod at Saint-Léger-sur-d'Heune bred twice in a year, both in May and in December; the winter clutch yielded five young out of six eggs, while the summer clutch of three eggs proved completely sterile. If this observation can be relied upon it furnishes an interesting case of a southern species with delayed adaptation to reversed season, and is the only case I know of.

The only pair I ever kept, lived a good number of years. They were extremely hardy, and though by no means striking in appearance they were very satisfactory in every other respect. They never showed any tendency to breed.

In American live-bird markets the Brown Pintail sold as low as $20.00 the pair, but since the War importation seems to have ceased. Sixty-seven specimens kept by the London Gardens lived on an average three years, four and a half months, the maximum being twenty-two years and nine months (P. C. Mitchell, 1911). In confinement they breed when one year old. In this country they seem to have first been bred by Mr. John A. Cox at East Brewster, Massachusetts (L. S. Crandall, *in litt.*).

Hybrids. The only wild-killed hybrid, so far as I know, was taken by R. M. Beck near Mar del Plata, Buenos Aires, in 1914. It was a cross with the Bahama Duck (*Anas bahamensis*), and is now in the Brewster-Sanford collection (American Museum of Natural History). In confinement the species has been crossed with the Common Pintail (*Anas acuta*), the Chiloë Widgeon (*Anas sibilatrix*), the Bahama Duck and the Carolina Duck. The hybrids produced by the mating of the Brown Pintail and Chiloë Widgeon proved completely sterile (Poll, 1911; specimens at Tring Museum).

EATON'S PINTAIL

ANAS EATONI (SHARPE)

(Plate 40)

SYNONYMY

Querquedula kerguelensis Clarke, Wreck of the 'Favorite,' p. 186, 1850 (*nomen nudum*).

Querquedula eatoni Sharpe, Ibis, ser. 3, vol. 5, p. 328, 1875.

Dafila eatoni Salvadori, Cat. Birds British Mus., vol. 27, p. 278, 1895.

VERNACULAR NAMES

English: Eaton's Pintail, Kerguelen Pintail.

German: Eaton's Spiessente.

French: Canard pilet d'Eaton

DESCRIPTION

ADULT MALE: Head and upper part of the neck dark brown, the feathers with narrow central darker stripes; nape blackish, with pale dottings; interscapular region and back brown, waved with narrow whitish bars; scapulars long and acuminate, black, with grayish edges, the outer ones black on the apical part outwardly; upper tail-coverts brown edged with whitish, the outer ones black on the outer web; under parts dull grayish, with a slight brown tinge on the crop-region which is thickly dotted with small blackish spots or streaks, the latter finer on the breast; sides and flanks regularly barred with black and white, the white bars the narrower; crissum black in the middle, grayish outwardly; wings grayish brown; speculum bronzy green, but the upper and lower parts velvety black bounded anteriorly by a narrow cinnamon band at the tip of the last row of the upper wing-coverts, and posteriorly by a sub-apical black band and by an apical white one; tertials gray on the outer web, blackish on the inner one, the outer tertial velvety black on the outer web, and with a very distinct whitish band along the inner part of the outer web; primaries brown on the outer web and at the tip, paler gray on the inner web; under wing-coverts brown-gray, with pale edges; tail brownish gray, the central tail-feathers black, elongated and acuminate; bill blackish, but probably in the living bird plumbeous; feet also dark in dried skins (Salvadori, 1895).

Wing 228 mm.; bill 34; tarsus 34. Out of 100 specimens in the flesh the males averaged: length 380 mm.; bills 34 (Loranchet, 1916).

ADULT FEMALE: General appearance like female Pintail. Head and lower parts almost exactly the same; upper surface in general browner in tone, with more brown and less white on the edges of the feathers of the mantle; wing almost the same as in the female Pintail, with speculum dull brown to blackish.

Iris black. Bill green, tipped with black. Legs green, claws black.

Wing 206 mm.; bill 32; tarsus 30 (U.S. National Museum specimen, 68974). Females average 350 mm. in length; bills 31 mm. (Loranchet, 1916).

IMMATURE MALE: Similar to female, but mantle and scapulars more or less barred with buff; long

scapulars nearly black, edged with buff; inner part of speculum bright green, outer part blackish; lesser wing-coverts plain slaty brown, the feathers not edged with buff as in the female; anterior wing-bar buff-colored, the posterior nearly white; head like the female's. The nape does not become black until full maturity. Vermiculated feathers begin to appear early on the mantle and scapulars.

Wing 223–228 mm.; bill 32 34; tarsus 36 (U.S. National Museum specimen, 68973, November 15, 1874; British Museum specimens).

YOUNG IN FIRST PLUMAGE: At first almost exactly like the adult female except the lower side which is streaked and mottled with brown as in the young of the Common Pintail.

YOUNG IN DOWN: Similar to the young of *Anas acuta* but the sides of the head distinctly rufescent; a tinge of the same appears also on the throat, breast and sides (Salvadori, 1895). The single specimen which I have seen corresponds exactly with Salvadori's description.

DISTRIBUTION

THIS species was first described from Kerguelen Island by Sharpe (1875). So far as known it is confined to that island, where successive travelers have been astonished by its great abundance (Kidder, 1875; Hüsker, 1876, p. 122; Moseley, 1879, p. 190; Studer, 1889; R. Hall, 1900; Loranchet, 1916).

The species found by Eaton on the Crozettes (Sharpe, 1877) was rediscovered by Vanhöffen (1905) and has been separated from *Anas eatoni* by Reichenow (1904) with the new name *Anas drygalskii*.

GENERAL HABITS

HAUNTS. This interesting duck, which is really an isolated race of the Common Pintail, existed in enormous numbers and in a state of profound innocence before the advent of man. It seems to depend on the tidal flats and estuaries for its food; but it occurs inland at elevations up to 2500 feet though it probably rarely goes higher than 1500 feet (Kidder, 1876; R. Hall, 1900). It seems likely that it must have sprung from some common ancestor of our northern Pintails rather than from that species itself.

WARINESS. Like most ducks that are found on uninhabited islands, these were by nature entirely unsuspicious until they were shot at by the visiting sealers, whalers or members of scientific expeditions. Moseley (1879) says the birds almost required to be kicked up before affording a shot, and in a valley which had been long unvisited they actually came up to him of their own accord. Persecution, however, soon makes them as wild as any ducks, and they will now even post sentinels, or fly at the least suspicion of danger (Studer, 1889).

DAILY MOVEMENTS. Their daily movements seem to be governed largely by the rise and fall of the tide. When driven off the mud-flats at high water they scatter in small groups to various parts of the interior (Studer, 1889). At nightfall they seem to congregate in larger numbers (Loranchet, 1916).

GAIT, SWIMMING, DIVING, FLIGHT. Dr. Kidder (1875) has described them as running about on the land like grouse or quail, exhibiting none of the clumsiness of most ducks. Their flight is strong, and they rise readily from land or water as do all true shoal-water ducks. Flocks seem to be small, a half-dozen apparently being the size of most companies.

VOICE. Observers have likened the voice to that of the European Teal, and have distinguished the whistle of the male and the quack of the female.

FOOD. Their main feeding grounds, at least after the breeding season, are the tidal flats in the deep bays, where they feed on isopods and amphipods, and sometimes they go well out to sea (Studer, 1889). Several naturalists have thought their chief food the seeds of the Kerguelen Cabbage (*Pringlea antiscorbutica*) but Hüsker (1876) denies this. He found the diet lacking all vegetable matter. Dr. Kidder describes the food as consisting of roots of *Azorella selago*, an umbelliferous shrub, grass-seeds, earthworms, larvæ, and small crustaceans that swarm along the seashore. Hüsker found remnants of small fish in two stomachs. No doubt considerable food is found inland during the breeding season. Hall found the birds along tiny brooks raising up the grass industriously for thirty or forty yards, or following the course of the brooks to hunt out tender roots.

COURTSHIP AND NESTING. Comparatively full accounts of the breeding habits have been published by various scientific expeditions to Kerguelen, but as these habits do not apparently differ from those of many other surface-feeding ducks, a detailed account is hardly necessary.

The pairing season begins early in November, and a nuptial flight was noted by Dr. Kidder on November 14. The earliest eggs were found by Hüsker on November 17. Other clutches have been found in December or early January, the last being February 4 (Studer). The nest is carefully constructed of wisps of grass and moss, lined with down, and is situated in a variety of places. Studer describes them as located sometimes on cliffs near the coast, sometimes in rocky clefts high on precipices. Others have been found on the ground under tussocks near the water (Kidder, 1875) or in the shelter of the *Acæna* (Hall).

The clutch is very small, varying from three to six. In one case Hall found a clutch of hard-set eggs numbering only two. The eggs are of a pale olive-green color, measuring 51 by 36 mm.

The young are mostly hatched by February, and the female seems to desert them before they are full grown, that is, in March (Loranchet, 1916). No notes have been made concerning the behavior of the males after incubation has begun.

STATUS. A good idea of its abundance may be obtained from a statement of Moseley's where he says that he killed twenty-seven of these Pintails in one day, and that similar bags were frequent, four or five guns usually bringing in over one hundred in one day. English officers are said to have killed two thousand within a radius of eight miles (von der Steinen, 1890).

ENEMIES. The only known enemy of this species is the Antarctic Skua (*Megalestris antarcticus*). The ducks seem to be much afraid of them, but it is doubtful whether they ever destroy full-grown birds. They seem to hunt the ducks only in a case of necessity, and occasionally destroy eggs or young. Hüsker found that they followed him about when hunting, and made attempts to get single or wounded birds. The ducks find excellent shelter under the leaves of the so-called cabbage.

FOOD VALUE. This is the only bird on Kerguelen which is really fit for food and in consequence it has been much appreciated by travelers hungry for fresh meat. The eggs also have been used for food.

BEHAVIOR IN CAPTIVITY. No live specimens have ever reached civilized countries.

CROZETTE ISLANDS PINTAIL

ANAS DRYGALSKII REICHENOW

SYNONYMY

Querquedula eatoni Sharpe, Transit of Venus Exped., zool., birds, p. 7, 1877 (in part).
Anas drygalskii Reichenow, Ornith. Monatsbericht, vol. 12, p. 47, 1904.

VERNACULAR NAME

English: Crozette Islands Pintail.

DESCRIPTION

MOST nearly like *Anas eatoni* of Kerguelen Island, but the sides of the body are not marked with wide blackish-brown bars, but like the sides of the lower neck, are covered with narrow blackish-brown and brownish-white, jagged, wavy lines (Reichenow, 1904).

DISTRIBUTION

THIS species is confined to the Crozette Islands, between Kerguelen Island and the Cape of Good Hope (R. B. Sharpe, 1877; Vanhöffen, 1905).

BAHAMA DUCK

ANAS BAHAMENSIS LINNÉ

(Plate 41)

SYNONYMY

Anas bahamensis Linné, Systema Naturæ, ed. 10, vol. 1, p. 124, 1758.

Anas ilathera Bonnaterre, Encyclop. Méthodique, vol. 1, p. 151, 1791.

Anas rubrirostris Vieillot, Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 108, 1816.

Mareca bahamensis Stephens, General Zool., vol. 12, pt. 2, p. 137, 1824.

Anas urophasianus Vigors, Zoological Journ., vol. 4, p. 357, 1829.

Phasianurus vigorsii Wagler, Oken's Isis, 1832, column 1235.

Dafila urophasianus Eyton, Monograph Anatidæ, p. 112, pl. 20, 1838.

Paecilonitta bahamensis Eyton, Monograph Anatidæ, p. 116, 1838.

Poecilonitta bahamensis G. R. Gray, List Genera Birds, p. 74, 1840.

Anas fimbriata Merrem, Ersch and Grube's Encyclop., sect. 1, vol. 35, p. 35, 1841.

Dafila bahamensis G. R. Gray, List Birds British Mus., vol. 3, p. 135, 1844.

Poecilonetta bahamensis Reichenbach, Synopsis Avium, Natatores, pl. 83, fig. 922, 1845.

Paecilonetta urophasianus Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.

VERNACULAR NAMES

English: Bahama Duck, Bahama Pintail, Green-winged Teal — (Andros Island).

German: Bahama Ente, Weisskehlige Ente.

French: Canard de Bahama, Canard à bec rouge.

Dutch: Bahama Taling.

Spanish: Pato de campo, Pato de la orilla, Pato pico roxo, Pato de rio, Pato jergon grande, Pato gargantilla.

Portuguese: Marreca toicinho.

DESCRIPTION

ADULT MALE: Whole top of head to just below the eyes, reddish brown, thickly streaked with black. All the rest of head and lower side of neck pure white. Upper side of neck paler brown. Mantle brown, thickly covered with round black spots. Scapulars black, edged with reddish. Back and rump black; upper tail-coverts and tail buff-color to reddish buff. Lower parts like the mantle, brown and heavily spotted, but the spotting thicker on the breast. Flanks with large black spots. Under tail-coverts rich reddish brown. Wing-coverts dark olive gray, except the last row, which are fawn-color at the tips, forming an anterior speculum band. Speculum bright green to coppery green with a narrow black band followed by a wide buff band formed by the tips of the secondaries. Primaries blackish, tertials long and pointed, black or olive black in center and bordered with fawn-color. Under wing-coverts mostly dark brown, but the greater ones gray and the inner ones white. Axillars white.

BAHAMA DUCK GALAPAGOS ISLAND DUCK AFRICAN RED-BILLED DUCK

Iris bright reddish sienna. Bill plumbeous or bluish, with the nail black, and a large patch at the base of the culmen red or crimson-red. Legs and feet rather dark lead-color.

Wing 205–232 mm.; bill 51–53; tarsus 38–41.

ADULT FEMALE: Similar to the male but slightly smaller.

Wing 198–222 mm.; bill 48–51; tarsus 36–38.

IMMATURE BIRD: Resembles adult as soon as first plumage is assumed.

YOUNG IN DOWN: Resembles in a general way the young of the Mallard, but the under parts are somewhat paler and lack the sulphur-yellow coloring. The anterior part of the trans-ocular streak between the eye and the culmen is less well defined than in the Mallard (specimen in British Museum).

DISTRIBUTION

THE Bahama Pintail has a wide distribution throughout the West Indies and South America. The northernmost record is for Cape Canaveral, Florida, where it has once been taken (W. S. Brooks, 1913). This is the only known occurrence on the mainland of North America, a rather remarkable fact in view of its being a common resident throughout the Bahamas. In those islands it has been recorded for Great Abaco, Andros, Watling's, Long Island, North, Great and East Caicos, Little and Great Inagua (Todd and Worthington, 1911; Cory, 1880; G. M. Allen, 1905; Bonhote, 1903; Riley, 1905; Fuertes, *in litt.*). It is by no means a common bird in Cuba, but has been found on the north coast near Sagua la Grande (Gundlach, 1881). In Jamaica it appears only occasionally (P. L. Sclater, 1910) and its occurrence on Santo Domingo is not certain, though Cory (1885) thinks he saw it a few times there. Gundlach (1878) saw it near Boqueron, Porto Rico, and Wetmore (1916) found it common and breeding in the Laguna de Guanica on the same island. Cory (1890b) has recorded it for St. Thomas in the Virgin Islands. In the Lesser Antilles it has, so far as I know, been found only on Anguilla (J. L. Peters, MS.) and on Barbuda and Antigua (Lawrence, 1878).

Florida

Bahamas

Antilles

On the mainland of South America the species is not found in Ecuador, Colombia or Venezuela, though it is included in Ernst's (1877) list of the birds of the last country. It is, however, found in British Guiana (R. Schomburgk, 1848; C. B. Dawson, 1916; Beebe, Hartley and Howes, 1917); it is common on the coasts of Dutch Guiana (F. P. and A. P. Penard, 1908–10) and has been recorded also from French Guiana (von Berlepsch, 1908).

The Guianas

In Brazil it seems to be found in the coastal regions only, where, however, it is often common (H. Burmeister, 1856). Natterer met with it on the lower Amazon and near Cajutuba (Para) as well as on the Rio Muria and near Sertão, Bahia (von Pelzeln, 1868–71). Goeldi (1894–1900) has recorded it from Marajo and the Prince zu Wied (1832) saw the species along the coast. According to H. and R. von Ihering (1907) it is found also in Rio Janeiro and Rio Grande do Sul.

Brazil

In the west, specimens have been taken at Cochabamba, Bolivia (von Boeck, 1884), and in Peru (Philippi, 1868), at Tumbez (Taczanowski, 1886) and commonly on the coast between Lurin and Chorillos, especially on the lagoons near Villa (von Tschudi, 1845–46). Lord William Percy collected a single specimen on Lake Poopo, western Bolivia, in June, 1920.

Bolivia

Peru

It occurs also in Paraguay (Bertoni, 1913) and in northern Argentina. H. Burmeister (1861) did not see it on the Paraná or farther west, but since then it has been recorded from Tucuman (Dinelli, *fide* Dabbene, 1910), from Cordoba (Frenzel, 1891; Schulz, *fide* Dabbene, 1910), from Entre Rios (A. H. Holland, 1896) and from Mendoza (Reed, 1916).

Argentina

It is much more common on the lower Paraná and in Uruguay. Barrows (1884) has reported it from Carhue and Tremoleras (1920) from Canelones, Uruguay, but in Buenos Aires Province it seems to be a not very plentiful autumn and winter visitor (Durnford, 1878; P. L. Sclater and Hudson, 1889; C. H. B. Grant, 1911; E. Gibson, 1920). Durnford (1878) says it is found generally south of Buenos Aires, but the only actual record of which I have any knowledge is that of Doering (1881) who met with it on the Laguna de Carhue, Rio Negro. In the Falklands it is known only as a straggler, one specimen having been taken there by Pack (Abbott, 1861).

Uruguay

Patagonia

It is of irregular occurrence in Chile, appearing commonly in some years and being practically absent in others (Quijada, 1910). Our information in regard to its distribution in this country is very meager, but I presume that it is confined to the northern and perhaps the central parts. L. Fraser (1843) described it as common on the lakes and rivers, but J. R. H. MacFarlane (1887) who met with it near Arica, says it is not very common even so far north. James (1892) describes it as only an occasional visitor.

Chile

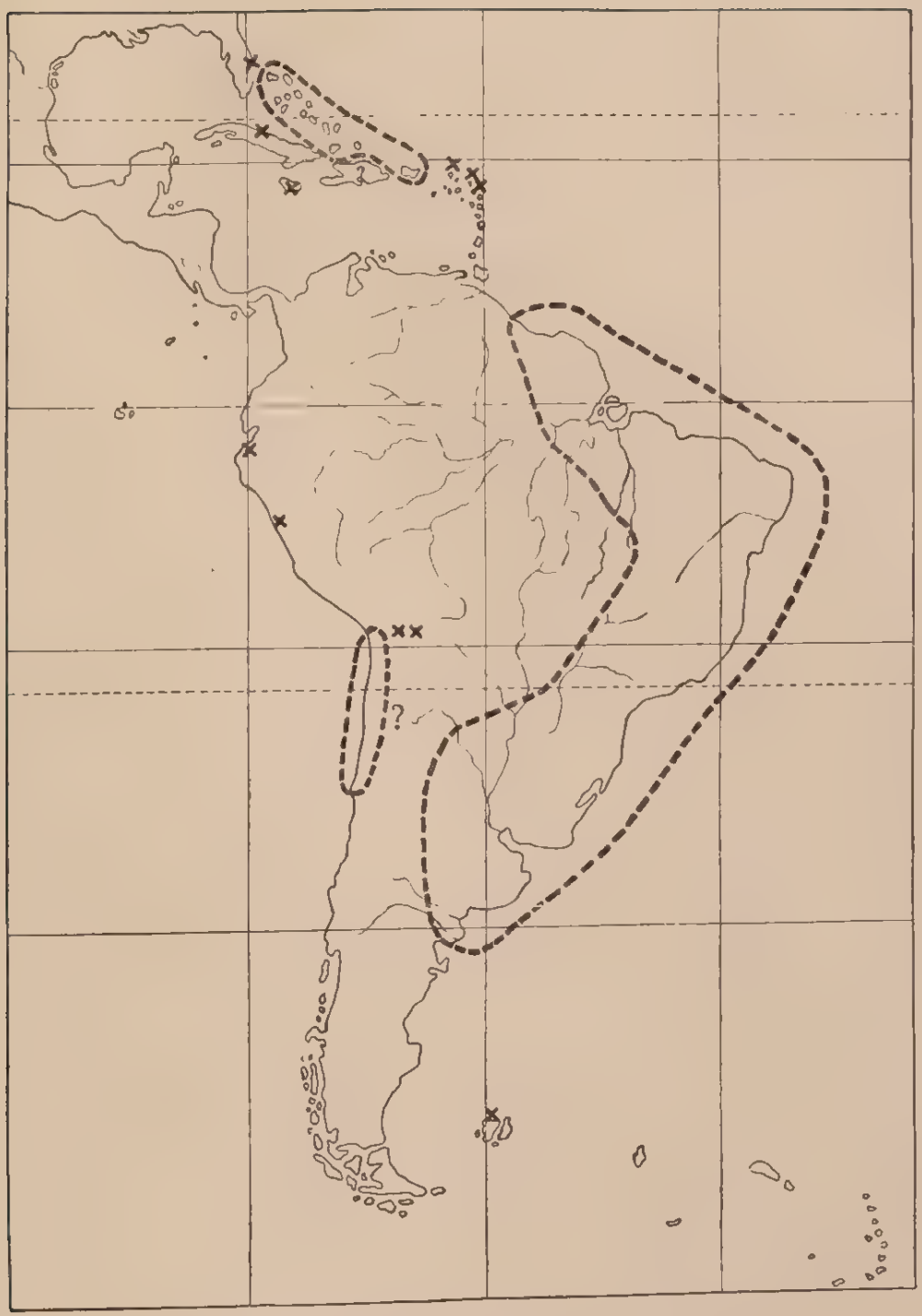
GENERAL HABITS

Haunts. The Bahama Duck is certainly closely related to the Brown Pintail (*Anas spinicauda*) and somewhat remotely to the Common Pintail (*Anas acuta*). A glance at the map of distribution shows its preference for tropical or semi-tropical coastal regions. In the Bahamas its habitat is well described by G. M. Allen (1905). He says that on the south side of Great Abaco there is a broad tidewater region known as "the marls." These flats are covered with a thin growth of small mangroves, grasses and a few other halophytes, while here and there are little pools surrounded by taller mangroves. In this region the Bahama Duck spends the entire year. Other naturalists have found it in tidal mangrove regions, or salt-ponds in the interior of the islands, and in Guiana it is almost confined to the coastal strip. H. Burmeister (1856) says it is found in Chile chiefly at the mouths of the larger streams, but is rare inland. In Buenos Aires Dr. Wetmore (MS.) found it in the interior, but usually at the mouths of fresh-water *arroyos* where they flow into the saline lakes.

Wariness. The Prince zu Wied (1832), who came across these ducks on the Brazilian coast during the earlier years of the past century, considered them shy. There is little information which gives one much idea of their behavior in this respect. Dr. L. C. Sanford told me that a flock of about twenty which he found on Andros Island behaved in a peculiar manner. After they had been shot at a few times, instead of flying when approached, they would run into the thick mangroves. After they had become "educated" he was never able to flush them.

Daily Movements. Nothing characteristic.

Gait, Swimming, Diving. This is strictly a surface-feeding duck, although the young dive.



MAP 59. Distribution of Bahama Duck (*Anas bahamensis*)
Sporadic records indicated by crosses (×)

Flight. On the wing Bahama Ducks look very much like Brown Pintails, but are easily distinguished by the white head-patch and the buffy-brown tail, which looks much lighter colored than the back.

In most regions they are not seen in large flocks, but companies up to ten or twelve are normal (A. H. Holland, 1892; Goeldi, 1894 1900; E. Gibson, 1920). Wetmore (*in litt.*) saw as many as fifty at a time in western Buenos Aires, and Bonhote (1903) claims to have seen flocks of one hundred or more in the northern Bahamas. Such aggregations must be very exceptional from what Drs. Barbour and Allen have told me of their experiences with the species during a cruise among the Bahamas.

Association with other Species. Over a large part of its range there are no other true ducks with which this species could associate, although in the Guianas they are said to feed with small water-fowl (*Dendrocygna?*), gathering into separate flocks at the approach of danger (F. P. and A. P. Penard, 1908–10). In the Argentine it is not uncommon to see it in the company of the Brown Pintail (A. H. Holland, 1892; E. Gibson, 1920).

Voice. The Bahama Duck is extraordinarily silent, and I do not recall ever having heard a note from those I kept, excepting from a male when in full display. This bird gave a few very low squeaky notes. Although no satisfactory description of the voice has been published, it is certain that it is quite different from that of the Brown Pintail. Heinroth (1911) describes the male's note as a high whistle, but Rogeron (1903) did not hear a whistle. He speaks of the note as a barely perceptible cry resembling the noise of certain insects, such as the capricorn beetles. I dare say this is exactly the same curious low note which I heard. Goeldi (1894-1900) who had ample opportunities for observing these birds, considers the male's note as somewhat like that of a domestic duck, but he referred of course to the female, and not to the male.

The female's voice has never been described, but Dr. Wetmore tells me that it is a high-pitched *quack* similar to that of a female of the Common Pintail. Few have heard this call, and I have often listened for it in vain.

Food. The only careful stomach analyses appear to be those of eight adults and two downy young collected by Wetmore (1916) and examined by Mr. W. L. McAtee. The birds, which were taken in spring, had been feeding entirely on vegetable matter. The seeds of widgeon-grass (*Ruppia maritima*) were found in every stomach and formed 16.25% of the total bulk. The largest number of seeds was 180 in one stomach. Foliage, and the antheridia of algæ (*Chara* sp.) made up the remaining 83.75% of the bulk. The two downy young had eaten animal matter up to 3.5%,

including water-boatmen, a water-creeper and young snails. Vegetable matter in the stomachs of these young consisted of the seeds of fox-tail grass (*Chætochloa* sp.), barnyard grass (*Echinochloa crusgalli*) and a species of Guinea grass (*Panicum* sp.).

Courtship and Nesting. With any species having such a tropical distribution it is obviously impossible to define the breeding period. In the West Indies it is a late-spring nester: the recorded nests have been found in late May (Cory, 1890; Wetmore, 1916). In the Argentine, males taken in late September had the sex glands either large or in the process of development (Beck, MS.), which indicates that it breeds in late October or early November.

The display was first described by Goeldi (1894–1900) and does not seem to have been carefully observed by any one else. I only once observed it in a single pinioned male, which at the time was kept in a small enclosed pond with Teal and a pair of Gadwall. It was on June 4, a late date. After one or two preliminary movements, such as extending the neck upward and holding it stiffly, there followed a very peculiar and definite performance. The bird suddenly cast himself forward on his breast, at the same time throwing his head back, spreading and elevating his tail and apparently slightly raising the tertials and scapulars. It seemed to me also that the wings were slightly opened. This single exhibition lasted about one and a half seconds, and was accompanied by three or four very low squeaky notes. In the fifteen or twenty minutes that I watched the bird, this display was repeated seven or eight times. The nuptial flight, if there is one, has never been described.

There is nothing characteristic in the position chosen for the nest, and the nest itself is merely a poorly constructed mat of any available material, probably always placed on the ground. When Mr. Fuertes was on Andros Island, Bahamas, painting the Flamingo colony, he wrote me that he had failed to find any nests himself, but he was told by a man named Bannister that the birds nested there in low mangroves from one to four feet above the ground, in places where the tide came and went. No actual nests have yet been described from such peculiar situations, and the statement requires further proof, but if such situations are commonly chosen, it would explain very well the apparent scarcity of nests in this species.

The clutch varies in size from six to nine, the average being about seven. The eggs are long and narrow, much more so than those of the Brown Pintail. They are uniform cream to reddish cream-color and measure 55–59 by 37–39 mm. The incubation period in the wild is not known, but captive-laid eggs have hatched in from twenty-five to twenty-six days (Wormald, *in litt.*). During the nesting period the male is said to remain in the immediate vicinity (F. P. and A. P. Penard, 1908–10). No one has noticed whether he accompanies the brood, but I feel convinced from the nature of the species, and the similar plumage of the sexes, that such may be the case.

STATUS. Although no definite information is available, it is fairly safe to say that in the West Indies, where noxious mammals have been freely introduced, this species will not be able to hold its own. Wetmore (1916) feels sure that it will disappear in Porto Rico unless properly protected. Many years ago it was classed as almost the commonest duck in Brazil (H. Burmeister, 1856) and this is probably still the case. It has been shot for the markets of Buenos Aires for many years (P. L. Sclater and Salvin, 1876) and can hardly be maintaining itself in Argentina.

ENEMIES. In the Guianas "Sapakaras," weasels and other destructive animals are said to prey upon the eggs (F. P. and A. P. Penard, 1908–10).

DAMAGE. None.

FOOD VALUE. The flesh is excellent. During dry seasons when all ducks are forced to resort to the coast, in the Guianas, this species is said to be less oily in taste than the others (F. P. and A. P. Penard, 1908–10).

HUNT. A description of the method used for hunting these birds in the Guianas is given by the Penards (1908–10). Evidently the hunters go out on moonlight nights and creep up to some "pan" where the birds are known to be feeding. They alarm the birds sufficiently to make them swim together, thus obtaining easy "pot" shots. The ducks are hunted there even in the breeding season and bring about fifty to sixty cents the dozen in the markets. A higher figure is paid when they are taken alive.

BEHAVIOR IN CAPTIVITY. The Bahama Duck was kept by Lord Derby in his famous Knowsley collection, at the sale of which, in 1851, the London Gardens procured specimens. These latter began to breed in 1853 and have done so fairly regularly ever since (P. L. Sclater, 1880). They have proved to be quite hardy, for the average length of life of twenty-four specimens kept was almost five years, the maximum being fourteen years and two months (P. C. Mitchell, 1911). This duck has been so commonly bred that hand-reared stock was usually obtainable before the War at a very reasonable figure, £3 or £4 the pair. They are now selling at a somewhat higher figure. It is usually classed with other Pintails as being very well adapted to life in captivity and it breeds at the age of one year. Besides it is a very stylish and showy little bird on the water, in spite of its sober garments, and has roused some enthusiasts, like Rogeron (1903), to a high pitch of eloquence. Indeed, there is something about it that makes it unusually attractive, and it always looks neat and in trim plumage at any season of the year. One breeder at least (Gourraud, 1885) found them very quarrelsome in the breeding season, but this was

perhaps due to the ponds being too crowded. Rogeron (1903) found them the acme of correctness and I must say that I never found my birds troublesome in the least, though of course trouble seldom comes unless one's birds are thoroughly mated.

In this country the species has, so far as I know, been bred only by Mr. Henry Cook (Job, 1915), but it used to be rather commonly kept, and before the War could be had at from $15.00 to $25.00 the pair.

The birds become very tame, and Rogeron's (1903) specimens learned to follow the gardener in order to pick up the earthworms as he turned the soil.

HYBRIDS. The wild-killed hybrid between this species and the Brown Pintail (*Anas spinicauda*) taken by R. M. Beck in Buenos Aires, has been mentioned under that species. In confinement the Bahama Duck has been crossed with the Mallard (*Anas boschas*) and the Brazilian Teal (*Anas brasiliensis*) (Poll, 1911). I saw a specimen of this latter hybrid at Tring.

GEOGRAPHICAL RACES

ANAS BAHAMENSIS BAHAMENSIS LINNÉ

CHARACTERS: Smaller; wing in male 209, in female 197.5 mm.; speculum bright green.

DISTRIBUTION: Florida (one record), Bahamas, Greater and Lesser Antilles, Guianas and northern Brazil.

ANAS BAHAMENSIS RUBRIROSTRIS VIEILLOT

Anas rubrirostris Vieillot, Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 108, 1816.
Paecilonitta bahamensis rubrirostris Bangs, Proc. New England Zoöl. Club, vol. 6, p. 87, 1918.

CHARACTERS: Larger; wing up to 232 mm. in males and 222 mm. in females. Speculum of a coppery-green color, not so clear green.

DISTRIBUTION: Southern South America, including southern Brazil, Paraguay, Argentina and Patagonia.

GALAPAGOS ISLAND DUCK

ANAS GALAPAGENSIS (RIDGWAY)

(Plate 41)

SYNONYMY

Poecilonitta bahamensis Gould (*nec* Linné), Voyage of the Beagle, Zool., vol. 3, p. 135, 1841.

Dafila bahamensis Sclater and Salvin (*nec* Linné), Proc. Zool. Soc. London, 1870, p. 323.

Anas bahamensis Sundevall (*nec* Linné), Proc. Zool. Soc. London, 1871, p. 126.

Poecilonetta galapagensis Ridgway, Proc. U.S. Nat. Mus., vol. 12, p. 115, 1889.

Paecilonitta galapagensis Bangs, Proc. New England Zoöl. Club, vol. 6, p. 88, 1918.

VERNACULAR NAME

English: Galapagos Pintail, Galapagos Island Duck.

DESCRIPTION

ADULT MALE: Similar to *Anas bahamensis*, but the line between the brown of the head and the white of the face not clean-cut, and spotted with brown. Top of head grayer. Mantle grayer and somewhat more uniform in appearance. Under tail-coverts grayer; axillars white, with irregular brown spots. Color of soft parts apparently the same as in the Bahama Duck.

Wing 190–215, average 203 mm.; bill 40–45; tarsus 31.1–36.0.

ADULT FEMALE: Similar to male, but slightly smaller, and the spot at the base of the bill yellow or orange, instead of red.

Wing 180–202 mm.; culmen 37–43.4; tarsus 29–33.7.

Note: Cases of partial albinism are not infrequent according to Gifford, and this is interesting in connection with the same phenomenon in the Laysan Teal and the Andaman Teal, both island species.

DISTRIBUTION

THIS species is confined to the Galapagos group of islands, where it has been generally found common. It was first discovered by Darwin (Gould, 1841) and has since then been recorded for the following islands: Albemarle, Duncan, Charles, Hood, Chatham, Barrington, Indefatigable, Jervis, Tower and Seymour (P. L. Sclater and Salvin, 1870; Sundevall, 1871; Salvin, 1876; Salvin, 1883; Ridgway, 1897; Rothschild and Hartert, 1899; Gifford, 1913).

GENERAL HABITS

WERE it not for the fact that this island form is entirely isolated from the true Bahama Duck, it would rank as a rather poorly marked subspecies. The only de-

tailed and thorough account of its life-history is that given by Gifford (1913). There seems to be no reason to suppose that in habits it differs from the Bahama Duck. Gifford found the species most common about the salt lagoons of the low coastal regions. It also frequented the fresh-water ponds and lakes, and the elevated portion of some of the islands. Some were also seen in a deep crater-lake on Tower Island. Only once were any seen on tidal water. The haunts vary greatly as the small lagoons often dry up. The birds were even seen moving about from place to place, flighting along the coast, one or two at a time.

Habel (*fide* Salvin, 1876) found these ducks "tame enough to be killed by a blow of a long switch or a stone. On the approach of a person, it will not fly, but paddles away a short distance; and when scared will not leave the lagoon entirely, but rather retires to another part of it." Gifford, who visited the islands so much later, found them still for the most part fearless. They would "swim towards a person, sometimes close enough to be killed by a stone." After the first discharge of a gun, those not killed would continue sitting on the water, merely bewildered. Only on Charles and Chatham Islands were they at times wary, perhaps because of greater persecution. When in charge of young they were naturally more cautious than usual.

These birds usually fly in small companies, but Gifford saw as many as a hundred together on South Albemarle. They associate largely with the American Flamingo, the Black-necked Stilt, and to a lesser extent with the Sooty Gull, the Blue-winged Teal (a rather common migrant), the Egret, and the Galapagos Heron.

During the mating season a low quacking note was heard. Beyond this nothing is known of the voice. There is no information about the food.

The following notes by Gifford show that the breeding season probably extends from October to July: October 5–6, two males with enlarged sex organs; November 6, female with enlarged ovaries; November, males noticed chasing each other, and sometimes pursuing females; January 11, four shot, all but one with enlarged sex organs; July 28, nine taken, all with enlarged sex organs. On February 25 a fresh egg, evidently accidentally deposited, was found on a low laval islet in Cormorant Bay. No actual nest was found, but young in down were seen on March 5, 6 and 10, and on August 24. The clutch and incubation period are probably the same as in the Bahama Duck. Among the few broods of young seen by Gifford the male was not in evidence.

AFRICAN RED-BILLED DUCK

ANAS ERYTHRORHYNCHA GMELIN

(Plate 41)

SYNONYMY

Anas erythrorhyncha Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 2, p. 517, 1788.

Anas melanura Vieillot (*nec* Gmelin), Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 135, 1816.

Tadorna erythrorhyncha Stephens, General Zool., vol. 12, pt. 2, p. 75, 1824.

Querquedula erythrorhyncha Smith, Cat. South African Mus., p. 36, 1837.

Paecilonitta erythrorhyncha Eyton, Monograph Anatidæ, p. 115, 1838.

Mareca erythrorhyncha Hartlaub, Verzeichniss nat.-hist. Sammlung Ges. Mus., p. 119, 1844.

Anas pyrrhorhyncha Forster, Icones Inedit., pl. 73; Descript. Animalium, p. 45, 1844.

Poecilonitta erythrorhyncha Rüppell, Systemat. Uebersicht der Vögel Nord-Ost-Afrikas, p. 138, 1845.

Anas punctata Reichenbach (*nec* Burchell), Synopsis Avium, Natatores, pl. 85, fig. 915–916, 1845.

Dafila erythrorhyncha Blyth, Cat. Birds Mus. Asiatic Soc. Bengal, p. 304, 1849.

Poecilonetta erythrorhyncha Gurney, Ibis, ser. 1, vol. 1, p. 251, 1859.

Nettion erythrorhyncha G. R. Gray, Hand-list Birds, vol. 3, p. 84, 1871.

Querquedula pyrrhorhyncha Holub, Beitr. Ornith. Südafrikas, p. 330, 1882.

VERNACULAR NAMES

English: Red-billed Teal, Red-billed Duck, Crimson-billed Duck.

German: Rotschnabel Ente, Rotschnäblige Krickente.

French: Canard à bec rouge.

Dutch: Smee-Eednje, Rood-bek Eend.

Hova: Fotsielatra.

Local Madagascan: Rahaky, Sadakely, Faralambotra, Filamatra, Lovilovy.

Basuto: Semto letata.

Entebbe: Dinoili.

Angola: Deleca.

DESCRIPTION

ADULT MALE: Top of the head to the eyes dark brown, sharply defined from the buffy white of the sides of the face, chin and throat. Neck gray, mottled with small black spots. Mantle dark brown

with the edges of the feathers lighter. Scapulars nearly black, with buff-colored margins. Back, rump, upper tail-coverts and tail dark brown, with some gray on feather margins. Under parts whitish, each feather with a subterminal dark-brown spot. Spots larger on the flanks. Wing-coverts very dark brown except the last row which have a wide buffy band at their tips. The speculum proper is very narrow, velvety black to iridescent green in color, and all the rest of the secondaries are buffy white, forming a conspicuous wing-patch. Primaries dark brown. Tertials dark brown with narrow buff margins. Under wing-coverts brown and gray; axillars barred with dark brown.

Iris brown. Bill dusky brown on top of culmen but brilliant pink on the sides and base of culmen. Legs and feet dark ash color (Andersson, 1872; T. Ayres, 1880).

Wing 207–220 mm.; culmen 40–44; tarsus 36–38.

Adult Female: Similar to the male.

Young in First Plumage: Resemble the adults, but all the feather markings, especially the light edgings of the wing-coverts, are not so well defined. The red of the bill is also duller than in the adult birds (Blaauw, 1919).

Young in Down: According to Salvadori it is similar to the same stages of *Anas bahamensis* but a shade darker on the under parts. According to Blaauw the young looks like that of the South American Ringed Teal, but the light parts, instead of being pearly white are pale lemon-yellow, whilst the dark parts of the upper side are also slightly tinted with yellow. Also there is a dark spot between the yellow of the breast and that of the throat, and the dark line that runs from the base of the bill through the eye does not quite reach the brown of the neck as is the case with the Ringed Teal (Blaauw, 1919). The specimens which I saw in the Leyden Museum seemed hardly to be distinguished from the downy Mallard except that the trans-ocular dark streak was more sharply defined and actually encircled the orbit. The superciliary light stripe was likewise very sharply defined from the almost black occiput, and the dark aural patches were present.

DISTRIBUTION

This is one of the commonest African ducks and its range is practically the same as that of the Hottentot Teal and other surface-feeding ducks of that continent. In the east it is found as far

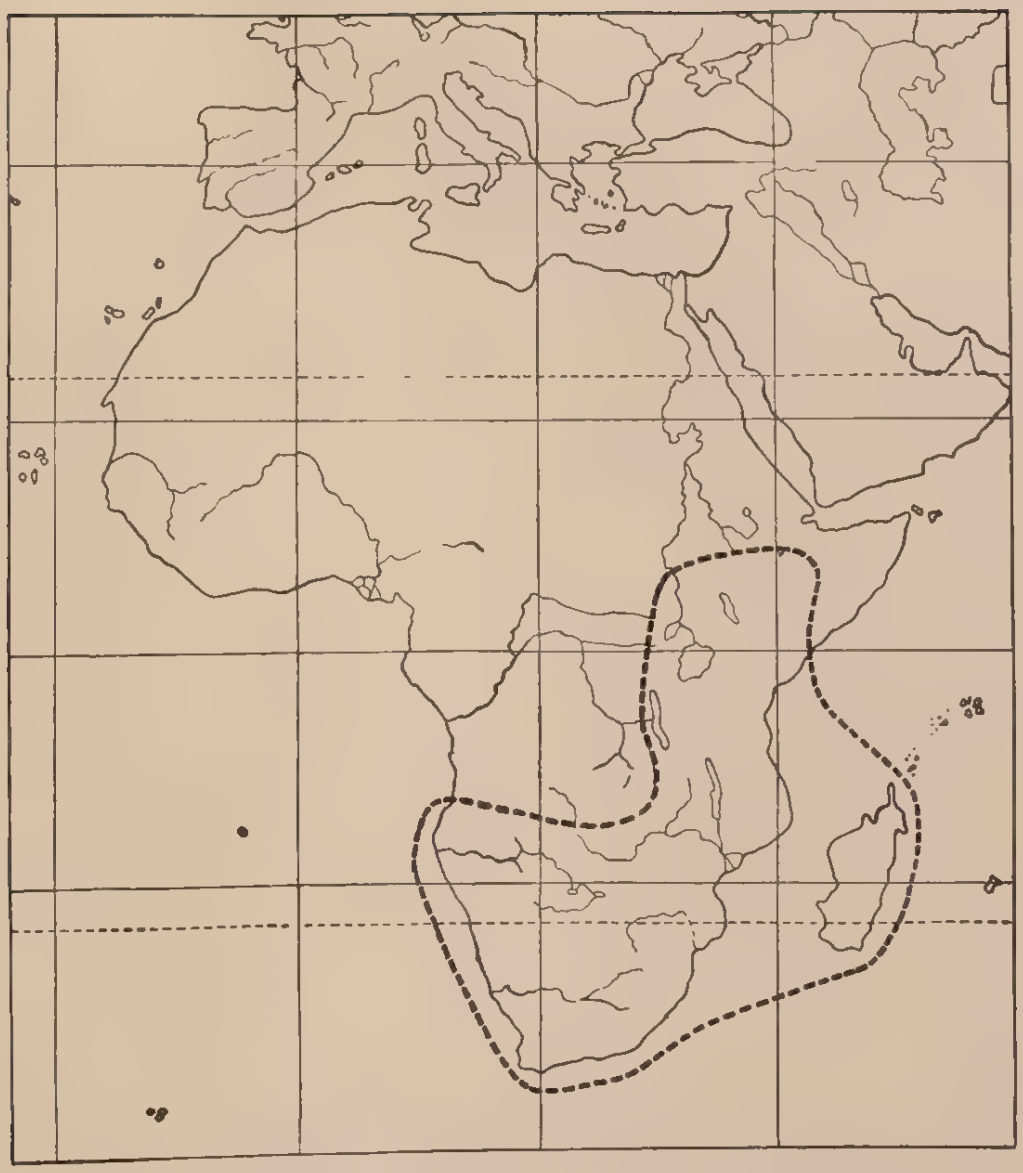
Abyssinia north as southern Abyssinia, whence it has been recorded from Taddaccia and Lake Cialalaka (Salvadori, 1884), Lake Tana, January to May (von Heuglin, 1873), Lake Harrar–Meyer, common in March (von Erlanger, 1905; Ogilvie-Grant, 1900) and Lake Ailan (Ogilvie-Grant and Reid, 1901). It has also been met with in British Somaliland (Shelley, 1885).

In Uganda specimens have been taken in southwestern Ankole (Ogilvie-Grant, 1905a) and on both sides of Lake Albert Edward (Sassi, 1912; Lönnberg, 1917). It is a fairly common species in British

Uganda East Africa, where it was found at Machakos (Hinde, 1898), but particularly on Lake Naivasha (Sharpe, 1902; W. Stone, 1905; G. H. Gurney, 1909; Bannerman, 1910). The British Museum has a specimen collected at Lamu. The species is found throughout the Masai

East Africa region (G. A. Fischer, 1884; Neumann, 1898) and apparently in the whole of what was formerly German East Africa. It is a common bird throughout the whole Kilimandjaro region (Sjöstedt, 1910; Reichenow, 1905), and has been recorded also from Mambojo, Zanzibar and Pangani (Kirk, *fide* Reichenow, 1900), from Umbugwe, Lake Manjara, Kwa Kitoto and Kibaja (Neumann, 1898), from Iunga and Massasi (*fide* Reichenow, 1900) and from Karema as well as various other localities on the east coast of Lake Tanganyika (Matschie, 1887; Böhm, 1885; Dubois, 1886a; Kothe, 1911).

Neave (1910) found the Red-bill generally distributed in the region of the upper Lufira, Katanga



MAP 60. Distribution of African Red-billed Duck (*Anas erythrorhyncha*)

district, Congo Free State, but it was nowhere common. It has seldom been recorded from northern Rhodesia (Stoehr and Sclater, 1906) but it was found in southern Rhodesia on the Ramaqueban River in March and November (F. Oates, 1881), and it is said to be fairly common about Salisbury in Mashonaland (G. A. K. Marshall, 1900). Farther west it was found on the upper Zambesi (Holub and von Pelzeln, 1882) and in Bechuanaland at Nocana in July (Fleck, 1894), and on the Botletle River (Bryden, 1893).

Congo Rhodesia

Eastward from Rhodesia this duck has been repeatedly recorded from the Nyassa region, from Karonga (Shelley, 1898), Luvonde (Shelley, 1896–1912), Lake Shirwa (Shelley, 1894), from Zomba (B. Alexander, 1900) and from the upper Shiré River (Hartert, 1898). In Mozambique it has been found in Gazaland (Swynnerton, 1908) and in the Beira and Inhambane districts (W. L. Sclater, 1912a).

Nyassa

In the Transvaal it was found by Holub and von Pelzeln (1882) on the Limpopo River. T. Ayres (1880) met with it about Potchefstroom in June and March, and Gilfillan (*fide* Stark and Sclater, 1906) met with it at Boksburg and Krugersdorp. W. L. Sclater (1912a) has recorded it from the southeastern Transvaal. In the Orange River Colony it was found at Vredefort Road by B. Hamilton, and according to Murray it is a very common bird in Basutoland (Stark and Sclater, 1906). S. R. Clarke (1904) met with it only occasionally near Bloemfontein. E. A. Butler, Feilden and Reid (1882) found this species in the Newcastle district of Natal. Gordge met with it near Durban and Fitzsimmons near Maritzburg (Stark and Sclater, 1906), while W. L. Sclater (1912a) has recorded it from Zululand. It is a fairly common bird and breeds in East Griqualand (C. G. Davies, 1908; Horsbrugh, 1912).

Transvaal Natal

It is one of the commonest ducks in Cape Colony and is generally distributed. The records are as follows: Pondoland (Shortridge, 1904), King William's Town (Trevelyan, *fide* Stark and Sclater, 1906), Grahamstown (British Museum), Port Elizabeth, common (Brown, *fide* Stark and Sclater, 1906), Aliwal North (C. H. T. Whitehead, 1903), Fraserburg Division (Burchell, 1822–24), Cape Division (South African Museum), Upington (Bradshaw, *fide* Stark and Sclater, 1906). In Bechuanaland it was found by Burchell (1822–24) near Kurnman, and by Bryden (1893) in the Mafeking Division.

Cape Colony

Andersson (1872) describes it as the commonest duck and breeding in Damaraland, and Fleck (1894) found it there at Rehoboth, Aris, Nosob and in the northern parts. It is equally common on the coasts of Mossamedes and on the Rio Coroca, but is not found north of Benguela (Barboza de Bocage, 1877–81).

Damaraland

In Madagascar it is a fairly common bird, especially on the east coast; the area of least abundance is probably the northwest coast (Roch and Newton, 1863; Hartlaub, 1877; Milne-Edwards and Grandidier, 1876–81; Sibree, 1892; U.S. National Museum; etc.).

Madagascar

GENERAL HABITS

This species, which has usually been placed with the genus *Paecilonitta* (Bahama Ducks), is certainly out of place there, for it is nothing like the Bahama Ducks or Pintails in appearance or habits, and its young have been shown to be quite distinct. Blaauw (1919) rightly remarks that its affinities are rather with the Teals. It probably has something in common with the Cape Teal.

There is nothing noteworthy about the type of country it inhabits. It is not a coastal bird but is fond of swamps and rushy pools, and is partial to small bodies of water surrounded by rushes (*Scirpus*) and the inlets of larger lakes. I have run across but one instance of its being seen on salt water.

WARINESS. This is a rather tame duck, according to Horsbrugh (1912) and Stark and Sclater (1906). Von Heuglin (1873) classed them as not shy in Abyssinia, where the natives do not eat water-birds. C. G. Davies (1911) in his account of the birds of East Griqualand says that he found them tamer than the Yellow-bill.

FLIGHT. The flight is swift, and by Roch and Newton (1863) was considered more rapid even than that of the Goose Teal (*Nettapus auritus*). Ordinarily these birds travel in small parties of eight or ten, but large flocks have been noted, even in Madagascar (Milne-Edwards and Grandidier 1876–81) and in southern Abyssinia (von Erlanger, 1905).

VOICE. Both the sexes are silent, and so seldom utter any sound that no accurate observations on the voice have been made. Blaauw (1919) describes the male as a remarkably silent bird. The only call he ever heard it utter was a subdued drawling note with very little sound in it and accompanied by an elevation of the head. Very likely this is only a courtship note, for Holub and von Pelzeln (1882) speak of a rapidly repeated whistle of medium strength. A rather low, harsh *quack*, seldom uttered, was spoken of by Horsbrugh (1912) and is undoubtedly the note of the female.

FOOD. Nothing is known about the food or feeding habits, but Roch and Newton (1863) state that in Madagascar the birds visit the rice-fields.

COURTSHIP AND NESTING. The very meager information available leads one to suppose that the season is just as irregular and extended as with most African ducks. Eggs have been found in South Africa in February and March (Stark and Sclater, 1906; Horsbrugh, 1912) while broods have been seen in September (Masterson, 1916). In the Kilimandjaro region a mature egg was taken from a female on May 18 (Sjöstedt, 1910) and on the Nyeri swamps half-grown young were found in June and July (Reichenow, 1905). A specimen in the U.S. National Museum, taken in British East Africa on July 20, had recently moulted the primaries.

No actual nests have been described, but they are said (Stark and Sclater, 1906; Horsbrugh, 1912) to be placed on the ground in thick cover on the borders of *vleis* or ponds. Sometimes, it is claimed, the nests actually float on the water, but such a position must be very exceptional with surface-feeding ducks. If such nests have actually been found they were probably floated by the rising water. The materials used are the same as those usually taken by shoal-water ducks. The clutch numbers from six to ten, the average being eight, or perhaps less. Captive females in Mr. Blaauw's collection generally laid only seven eggs, and broods of only five young appear to be common. The eggs are of a light greenish-white color and measure

about 50.8 by 39.4 mm. (Stark and Sclater, 1906). The incubation period and the behavior of the male during and after this time have never been studied or described.

STATUS. In South Africa this species is, next to the Yellow-bill, perhaps the commonest of the smaller ducks (F. Oates, 1881; E. A. Butler, Feilden and Reid, 1882; Stark and Sclater, 1906). In the Transvaal it appears to be by far the commonest duck (T. Ayres, 1880) and the same is true of Damara- and Great Namaqualand (Andersson, 1872).

DAMAGE. These ducks are said to visit the rice-fields in Madagascar (Roch and Newton, 1863), and possibly may cause some little damage to the crops.

FOOD VALUE. This is an excellent bird for the table (E. A. Butler, Feilden, and Reid, 1882; Sibree, 1892; Stark and Sclater, 1906). Davies called it "quite the best eating of all our duck," referring in general to South Africa.

HUNT. Sibree (1892) states that in Madagascar it is considered the most tender of all the ducks and was especially sought after at Antananarivo for the Queen's table. He adds that all Her Majesty's birds had to be shot with small slugs of iron wire, and not with lead, lest by accident a little lead swallowed should result in lead-poisoning!

BEHAVIOR IN CAPTIVITY. Pollen found this species kept by the inhabitants of Bourbon and Mauritius (Hartlaub, 1877), but evidently it has not been systematically introduced there.

Although a very rare duck in collections it was imported into England at an early date by Lord Derby. The London Gardens obtained five specimens when the Knowsley collection was sold in 1851. These specimens bred in the Gardens annually from 1856 to 1860 (P. L. Sclater, 1880) but the species was then lost and was not reintroduced until the early part of the present century. Pocock (London Field, May 1, 1915) speaks of it as a very rare bird in captivity and hardly ever obtainable in England. He had known of only one or two pairs being offered for sale during the previous five or six years. These were said to have been bred on the Continent. The recent specimens in the London Gardens came through the King's African collection in 1911. The few obtainable in European markets have always been very expensive, and before the War were said to be worth £5 to £6 the pair (Horsbrugh, 1912). One of the earlier specimens in the London Gardens lived to the age of twelve years and eight months (P. C. Mitchell, 1911).

On the Continent this species was recently bred by Mr. Blaauw (1919) on his estate at Gooilust, Holland. He was the first to describe the downy young and immature plumages. The Red-bill has never been introduced into America so far as I know.

GARGANEY TEAL

ANAS QUERQUEDULA LINNÉ

(Plate 42)

SYNONYMY

Anas querquedula Linné, Systema Naturæ, ed. 10, vol. 1, p. 203, 1758.

Anas circia Linné, Systema Naturæ, ed. 10, vol. 1, p. 204, 1758.

Anas balbul Gmelin, Linné's Systema Naturæ, ed. 13, vol. 1, pt. 2, p. 543, 1788.

Anas crecca, var. β; var. δ, Latham, Index Ornith., vol. 2, pp. 873, 874, 1790.

Querquedula circia Stephens, General Zool., vol. 12, pt. 2, p. 143, pl. 51, 1824.

Querquedula glaucopterus Brehm, Oken's Isis, 1830, column 997.

Querquedula scapularis Brehm, Oken's Isis, 1830, column 997.

Boschas circia Swainson, Classification of Birds, vol. 2, p. 367, 1837.

Cyanopterus circia Eyton, Monograph Anatidæ, p. 130, pl. 2, fig. 3, 1838.

Pterocyanea circia Bonaparte, Icones Fauna Ital., Uccelli, Introd., p. 17, 1841.

Anas humeralis S. Müller, Verh. Land- en Volkenk., p. 159, 1839–44.

Querquedula vulgaris Hodgson, Gray's Zool. Miscellany, p. 86, 1844.

Cyanopterus querquedula Hartlaub, Verzeichniss nat.-hist. Sammlung Ges. Mus., p. 119, 1844.

Querquedula humeralis G. R. Gray, Genera Birds, pt. 3, p. 616, 1845.

Pterocyanea querquedula Lichtenstein, Nomenclator Avium, p. 102, 1854.

Pterocyanea [sic] *scapularis* Brehm, Vogelfang, p. 375, 1855.

Querquedula querquedula Baird, Amer. Journ. Sci. and Arts, ser. 2, vol. 41, p. 339, 1866.

Anas pterocyanea Goeldlin, Journ. f. Ornith., vol. 27, p. 382, 1879.

VERNACULAR NAMES

English: Garganey Teal, Summer Teal, Blue-winged Teal, Pied Widgeon, Cricket Teal.

French: Sarcelle d'été, Cercelle, Alebrande, Garsotte, Arcanette, Anette, Craquette, Crecque criquet, Criquart, Canette, Cache-pignoun, Cartier, Sarcelle de mars, Carquet, Racleux.

German: Knäkente, Schnärrente, Sommer Halbente, Kriekente, Kriechente, Zirzente, Schmielente, Scheckente, Rothälslein, Kernell, Sarcelli, Kläfeli, Krüzele, Weissmergle, Ratscherle.

Danish: Atling, Sommerkrikand, Atlanand, Fjordand.

Swedish: Arta, Artand, Lortand, Dylpann.

GARGANEY TEAL

Norwegian: Knaekand, Suurput, Dukand, Krikand.

Icelandic: Tanmönd. *Finnish:* Heinatair.

Dutch: Zomertaling, Teling. *Walloon:* Mer canette.

Spanish: Patito, Cerceta, Anade cercetilla, Roncardele, Zarzeta, Garcetilla, Lavanquillo, Chuparan, Rangedeira, Marroquinho, Sarceta d'estin, Xarxet.

Portuguese: Marreco, Marrequinho, Rangedeira, Cantadeira.

Italian: Marzajola, Mascaruneddu, Gircuredda, Cercedola, Garganello, Sartella, Arzaval, Rouchet, Crecola, Raganela, Anitrella d'estate, Trizzola, Trizzotta, Riddena, Germanello.

Maltese: Sarsella hanira. *Arabic:* Kerkedje, Arash.

Greek: Boskas, Phaspas.

Croatian: Patka pupcanica, Patka srpasta, Krzulja.

Czech: Cirka modra. *Hungarian:* Pergo recze, Bojti recze.

Polish: Kaczka cyraneczka. *Esthonian:* Prihshke.

Russian: Chirok-treskundshik, Treskun, Chiruka, Chirok korostilen, Sesik.

Slavonian: Chrapacka watsja.

Montenegrin: Ckruga. *Bosnian:* Krokotavak.

Bengali: Gangroib, Girria. *Bulgarian:* Krecital.

Japanese: Shima-aji. *Hindu:* Chaitwa, Khaira, Patari.

Ostiaks: Pürri, Pilgy, Pyrni, Pakke. *Samoyeds:* Pjosok.

DESCRIPTION

Adult Male: Top of head and occiput blackish brown with a few fine light streaks on the forehead. From above the eyes, and extending back along the sides of the head a conspicuous whitish band. Sides of the head and neck rich brown, finely streaked with white; chin black. Breast and extending around to middle of mantle, brown, banded with crescentic black bars. Middle of mantle brown, the feathers with lighter edges. Back, rump and upper tail-coverts blackish, with irregular lighter bars. Tail black with buffy edges to the feathers. Abdomen white, becoming yellowish toward the vent, and more or less vermiculated with black. Flanks with wavy black lines. Under tail-coverts buffy with round black spots. Wing-coverts and outer scapulars bluish gray with a broad white band on the greater coverts. Speculum bright green with a posterior white band. Primaries dark brown. Tertials and inner scapulars dark brown, ornamented with white central stripes. Under wing-coverts dark gray except the central ones which are white like the axillars.

Iris hazel. Bill black. Legs and feet greenish or bluish gray to ash gray.

The full breeding dress is assumed much later in the season than is the case with most other ducks, a characteristic in common with the American Blue-winged Teal and the Shoveller.

Wing 192–202 mm.; bill 38–41; tarsus 29–31.

Weight 10 ounces to 1 pound 3 ounces (0.28 to 0.56 kilograms).

Adult Female: General color above dark brown, the edges of the feathers light gray. A broad superciliary stripe is whitish and a band behind the eye brownish. There is a white, or nearly white,

rounded spot at the base of the culmen, similar to the spot on the head of the female Formosan Teal. Remainder of cheeks streaked brown and white; chin and upper throat immaculate buffy white. Upper breast mottled and remainder of lower parts nearly white, except lower abdomen and under tail-coverts, which are streaked with brown. Flanks dark brown, the feathers edged with whitish. Wings nearly as in the male, but speculum less brilliant. Soft parts same as in the male.

Wing 183–195 mm.; bill 38–40; tarsus 29–31.

Weight 9 ounces to 15 ounces (0.25 to 0.42 kilograms), exceptionally up to a pound (0.45 kilograms).

Young in First (Juvenal) Plumage are like the female, but are finely streaked and spotted all over the lower surface. The sexes closely resemble each other at this time.

Male in Eclipse Plumage: Resembles the adult female, but the upper wing-coverts and the speculum are as in the breeding dress. The eclipse plumage begins to be assumed by early or mid-July and is complete early in August. It is retained very late, that is, all through autumn and early winter. Breeding dress usually is not complete until late February or March.

Downy Young: Very similar to young of the Mallard, but smaller. They are very dark, almost black above, especially so on the occiput. The lower parts are buffy to sulphur yellow with a darker area on the upper breast. The face pattern is the same as in the Mallard with a light superciliary streak and a dark trans-ocular streak. There is, however, a larger and darker aural patch, which runs forward to the base of the bill. The white dorsal spotting is the same as in many other ducks. Compared to the young of the American Blue-winged Teal this is very much darker above and has the face pattern much more prominent. It differs from the young of the Common Teal in being darker above, black instead of dark brown. It may also be distinguished by the well-marked and prolonged aural streak which in the Common Teal is only a small aural patch.

Note: Pallid varieties of this Teal are mentioned by several writers. They are said to be not uncommon in India and near Odessa (Nordmann, 1840: J. H. Gurney, in Dresser, 1871–81; Finn, 1907; Stevenson, 1858). Radde (1884) noticed that in what he considered old male specimens the white upper eye-stripe becomes very wide and stretches down the back of the neck more than half way. (The same thing happens in our American Blue-winged Teal, *Anas discors*, and has even been made the basis of a geographic race.) Radde adds that in such specimens the throat spot becomes a beautiful pitch-black color.

DISTRIBUTION

The Garganey is one of the less common, although one of the more widely distributed of the ducks. This is due largely to the fact that a very broad area of passage lies between the breeding and wintering grounds. So far as I know the species has never been reported breeding north of the Arctic Circle, and probably it does not nest north of 64° or 65° north latitude. The extreme southern limit of the breeding range is apparently 30° north latitude. It seems to nest in Iceland, on the Myvatn and near Akureyi (Hantzsch, 1905), but only occasionally and in very small numbers. All records for Iceland are for the months of June and July. It is an extremely rare bird on the Faroes (Millais, 1902) as well as on the Shetlands. At one time Garganey were reported to have bred on the latter islands, but the statement was probably unfounded (Evans and Buckley, 1899). Throughout the mainland of Scotland it is an exceedingly rare bird, and is not known to have ever nested. There are records of its occurrence in the Outer Hebrides (Harvie-Brown and Buckley, 1888), the Inner Hebrides (Harvie-Brown and Buckley, 1892), the Orkneys (Buckley and Harvie-Brown, 1891), Sutherland (Harvie-Brown and Buckley, 1887), the Moray Basin (Harvie-Brown and Buckley, 1895), the Tay Basin

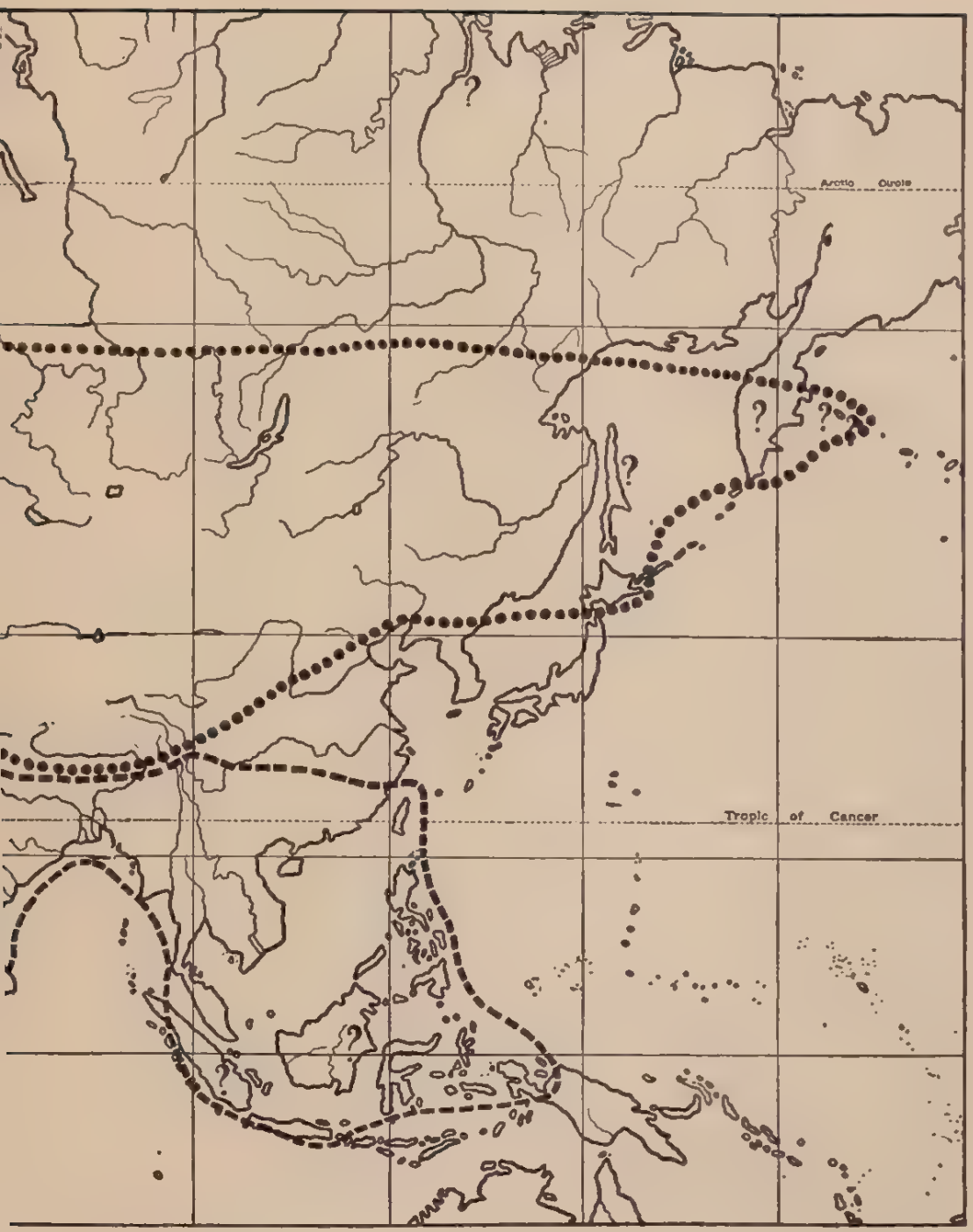
Iceland

Shetlands

Hebrides

MAP 61. Distribution of

Breeding range, dott



Teal (*Anas querquedula*)
· range, broken line

(Harvie-Brown, 1906) and the Tweed area (Evans, 1911). In England the species still breeds in very limited numbers in the southeastern counties, from Norfolk to Kent (Brit. Ornith. Union Checklist, 1915), and occasionally in recent years in Durham, York, Hampshire and Somerset, Essex and Sussex (Hartert, 1920a). Stonham (1908) states that it has nested also in Lincoln, Warwick, Huntingdon and formerly in Northumberland. In Ireland it has never been known to breed, and there are only about twenty records of its occurrence on that island at any time (Ussher and Warren, 1900). **British Isles**

On the Continent the Garganey has occurred from time to time on the south coasts of Norway, from Hvaler to Jaederen (Schaanning, 1913); it is not known to have actually bred there. It is more common in southern Sweden, where it breeds as far north as 60°, nesting commonly at Gothenburg, in Kalmar and in Ostergothland (Nilsson, 1858) as well as at Hjelstaviken, Skane and on the island of Öland (Meves, *fide* Dresser, 1871–81). Wallengren (1854) speaks of it as a common breeder in Bohus and Wermland, but rare in Gothland and Södermanland, while in Uppland and Dalekarlia it does not occur at all. It is a common breeding bird in Denmark, especially in Jutland (Kjaerbölling, 1850; Naumann, 1896–1905; etc.), and nests in limited numbers throughout Germany, more commonly in the east than in the western parts (Naumann, 1896–1905). A few nest in the Netherlands (Schlegel, 1859), in Belgium (Dubois, 1912) and in Luxembourg (La Fontaine, 1865–72). Lack of information makes it difficult to speak with certainty as to its status in France. It probably nests throughout the country in small numbers, and has been so recorded for Picardy (d'Aubusson, 1911), Anjou (Rogeron, 1903), Montlucon (des Prugnes, 1912), Savoy (Bailly, *fide* Dresser, 1871–81) and the Rhone Delta (Barthelemy-Lapommeraye, *fide* Clarke, 1898). It is not known to breed in Portugal, and in Spain does so only in the *marismas* of the lower Guadalquivir, where in wet seasons it is common (A. Chapman and Buck, 1910). **Scandinavia** **Denmark** **Belgium** **France** **Spain**

The Garganey is not recorded as having bred in Corsica, but it is said to do so in Sardinia (Bonomi, *fide* Giglioli, 1889–91), in Sicily (Malherbe, 1843) and perhaps in Malta, where it is seen at all seasons (C. A. Wright, 1864; Despott, 1917). In Italy proper it nests in some of the more northern Provinces, having been recorded from Tuscany, Venice, Lombardy and Piedmont (Giglioli, 1889–91). It breeds on some of the lower-lying lakes of Switzerland also (Fatio, 1904). In Bohemia it is an abundant nesting bird (Fritsch, 1872), and the same is true of Austria (Mojsisovics von Mojsvár, 1897), Hungary (Madarász, 1884) and eastern Slavonia (Schweppenburg, 1915). Strangely enough it does not seem to breed in Poland (Taczanowski, 1888), excepting in the Kielce Government (Katin, 1912) and presumably in Posen (Hammling, 1917), for it does so throughout Russia, and even in Finland. In this latter country it nests, though not commonly, from the Gulf of Finland north to the head of the Bothnian Gulf and inland at least as far as Knopio (63° north latitude), if not as far as Kajana (64° north latitude) according to Palmén (1876). Dresser (1871–81) found it on the coast at Uleaborg, and thinks the species breeds there. Pleske (1886) gives two authorities for its occurrence at Tornea. It is not known to occur in Lapland or on the Kola Peninsula, but it nests on the White Sea, commonly about Shishgin Light (E. von Middendorff, 1891) and abundantly at Archangel (Seebohm, 1882a). Harvie-Brown (1876), however, did not see it on the Petchora. About Ladoga it is not common (Liljeborg, 1852) but it is fairly abundant as a breeder at Petrograd (J. von Fischer, 1872; Bianchi, 1907), in Novgorod (Bianchi, 1910), in Pskov (Zarudny, 1910) and throughout the Baltic Provinces (Loudon, 1909). In central Russia it breeds very commonly in Moscow and Tula (Menzbier, 1881; Lorenz, 1892) and in eastern Russia it is found in summer in Kazan (Russki, 1893) and on most of the lakes of the Urals (Harvie-Brown, 1878). It is much rarer than the Common Teal in southern Russia (Radde, 1854), but it breeds in Ekaterinoslav (Valkh, 1911), in the Crimea (Brauner, 1899), Cherson (Brauner, 1894), in Kief (Goebel, 1870) and in Podolia (von Zedlitz, 1917). **Sardinia** **Italy** **Switzerland** **Russia** **Finland** **Lapland**

In the Balkans the species probably nests at least as far south as central Greece for it has been so reported for Bessarabia, Rumania, Bulgaria and Montenegro (Radakoff, 1879; Reiser, 1894; Elwes and Buckley, 1870; Lintia, 1909; Reiser and von Führer, 1896), and for Transylvania where it was common in May (Danford and Harvie-Brown, 1875) and undoubtedly nests. It is not absolutely certain that it breeds in Greece but such an excellent authority as Lord Lilford (*fide* Dresser, 1871–81) assumed that it nested in Epirus, while Powys (1860) thinks some nest in western Greece and Lindermayer (1860) is of the opinion that many may nest in central Greece, especially on Kopai Lake and about Thermopylæ. Very probably it nests even in Crete (Spratt, 1865, vol. 2, p. 406), for it does so to some extent in Cyprus (Bucknill, 1911). So far as I know it has never been found breeding in Asia Minor or in Palestine, but Weigold (1913) speaks of it as a common duck on the inundated plain of the Meander as late as March 27, and in Egypt it has been found breeding at Birket-el-Kurun (Kaiser, 1890), while Shelley (1872) spoke of it as a resident in Egypt, a statement which has not been verified in recent years. Carstensen's (1852) statement that it breeds in Tangiers cannot be accepted without further evidence, as this writer is unreliable.

Balkans **Crete** **Asia Minor** **Egypt**

In Asia the Garganey nests occasionally in Armenia (Nesterov, 1911) and possibly rarely in Mesopotamia (C. B. Ticehurst, Buxton and Cheesman, 1922), but evidently more commonly in the Caucasus (Seebohm, 1883; Radde, 1884) and abundantly throughout the Kirgis Steppe region (Nazarow, 1887; Seebohm, 1882; Suschkin, 1914). Molčanov (1912) reports three specimens taken in late July at the mouth of the Amur-Daria, while in Transcaspia it breeds rarely on the Tedshen and at Merv (Zarudny, 1889–90). According to both Radde (1886) and Zarudny (1911) the Garganey breeds also in northwestern Persia, on the south shore of the Caspian. Severtzoff (Dresser, 1876) and Lansdell (1885) found it nesting all over Turkestan, with the exception of the desert region of the southwest, while Laubmann (1913) says it breeds on the Maryn and Tekes Rivers in the Tien-shan. Schalow (1908) states that it nests in the southeastern Tien-shan, as it does commonly in the Pamirs (Severtzoff, 1883) and doubtless in Yarkand (Scully, 1876). Zarudny (1911) says it nests rarely so far south as the Seistan region of Afghanistan. These may have been distinctly localized areas.

Western Asia

Farther north the Garganey breeds in the eastern Altai (Hesse, 1913), while Finsch (1879) met with it on the Sassyk Ala-kul and the Aul Uwanas in May, and on the Marka-kul in June. Suschkin (1913) says it breeds about Minussinsk, in the Urjanch region, on the Saissan-nor and in the Russian Altai, and Finsch (1879) saw a specimen in a collection at Omsk. Zalesski (1915) has reported a specimen taken at Tomsk in late April and it has even been said that the species breeds to some extent in the Tobolsk Government (Ushakov, 1913).

Altai

Farther east the Garganey breeds throughout the rest of Asia south of 58° or 59° north latitude (Buturlin, 1908). Popham (1897) took a specimen at Jeneseisk, and both Dybowski (Taczanowski, 1873) and Maak (1859) found it breeding in Transbaikalia. Buturlin (1908) fixes its northern breeding limit on the Lena at 58° or 59° north latitude, which seems to be correct, though it evidently straggles much farther north. Bunge (1883) has recorded specimens from Shigolows and even from Tasary, at the mouth of the Lena. Radde (1863) found it breeding in Amurland and on the Tarei-nor, while Prjevalski (1878) says it nests as far south as the valley of the Hoang-ho. Very probably it breeds in Manchuria, for it does so on Lake Hanka (Prjevalski, 1878), and on the island of Yezo (Lönnberg, 1908). Its nesting on Saghalin has not yet been satisfactorily proved. Nikolski (*fide* Taczanowski, 1893) thinks it breeds there, but at best it is probably a rare breeder everywhere in the Far East. On the mainland, A. von Middendorff (1853) met with it as far north as Uda, while specimens, evidently breeding, have been taken in Kamchatka (Stejneger, 1885) and Bering Island (Taczanowski, 1893; Hartert, 1920). Taczanowski (1893) gives dimensions of eggs which he says come from Kamchatka and Bering Island. On the Kuriles the species is found only on migration (Lönnberg, 1908).

Trans-baikalia **Manchuria** **Saghalin** **Kamchatka**

There is no real evidence that this Teal nests in Tibet or in India, though it probably does so in the former country and in the Himalayas of Kashmir (Hume and Marshall, 1879; Baker, 1908). India

Winter Range

The Garganey is a very sensitive bird and requires warmer climates and probably more animal food than other ducks, so that it is one of the first to go south in autumn. The more northern breeders, that is, the minority, may perhaps winter in the more temperate regions, while the great majority, after nesting in temperate countries, go far south to spend the cold season. In the British Isles it has wintered very occasionally in England (Stonham, 1908) and Ireland (Ussher and Warren, 1900), but it does not do so in any of the northern or central countries of the Continent. A few seem to winter in southern France, in the Var department (J. H. Gurney, 1901), in the lower parts of Switzerland (Fatio, 1904) and in southern Hungary (Petényi, 1884; Chernel, *fide* Naumann, 1896–1905). British Isles

In the Mediterranean countries of Europe the Garganey is not common in winter. It is found all over Spain, but cannot be called common (Reyes y Prosper, 1886; Arévalo y Baca, 1887). The same is true of Portugal (de Seabra, 1910). It occurs in the Balearics (Barcelo, *fide* Reyes y Prosper, 1886), but apparently winters only very rarely in Corsica (Wharton, 1876; Jourdain, 1912). In Sardinia it seems to winter regularly (Bonomi, *fide* Giglioli, 1889-91), as it does in parts of Sicily and apparently in Malta (Giglioli, 1889–91; C. A. Wright, 1864; Despott, 1917). It does not winter on the Dalmatian coast (Kolombatovič, 1903), but seems to be quite common in the southern part of the Balkan Peninsula, in southern Bulgaria (Radakoff, 1879), in Macedonia (P. J. C. McGregor, 1906; Sladen, 1918) and all over Greece (Lindermayer, 1860). Southern Europe

Most of the European breeding birds spend the winter in Africa, where they seem occasionally to go very far south. It has been taken in southwestern Morocco (Menegaux, 1913), and is said to be accidental on the Canaries (Cabrera y Díaz, 1893–94). Rochebrune (1883–85) claims that it is fairly common in Senegambia. The statement may in this case be correct, for in northern Nigeria, at Zaria and Sokoto it occurs in flocks numbering hundreds (Hartert, 1886, 1915). The fact that it has been taken in early March at Ouargla, central western Sahara (Hartert, 1913), may indicate a regular migration route over the desert, rather than by the coast. Other species of ducks have been found in the center of the desert. Salvin (1859) saw it in the eastern Atlas and other writers (Loche, 1867; Taczanowski, 1870) have recorded it as common in Algeria. In both this Colony and in Tunis, however, it appears chiefly as a bird of passage, if one is to judge by the literature. It is exceedingly common in Tunis (König, 1888; Talamon, 1904; Millet-Horsin, 1912). Morocco Nigeria Algeria

In East Africa the Garganey is primarily a bird of passage in Lower Egypt (Nicoll, 1919), though some undoubtedly winter in Egypt and Nubia. In the Sudan it is very common along the course of the White Nile (Jägerskiöld, 1904; A. L. Butler, 1905; Ogilvie-Grant, 1902) and thence throughout southern Abyssinia (von Heuglin, 1873; Salvadori, 1884, 1888; Ogilvie-Grant and Reid, 1901) east to Lake Harrar-Meyer (Ogilvie-Grant, 1900; von Erlanger, 1905). Its winter range in this region extends at least as far as the equator. It has been taken even farther south, in southwestern British East Africa (G. H. Gurney, 1909), on Lake Albert Edward (Hartert, 1920a) and in the lowlands about Kilimandjaro. Sjöstedt (1910) says he met with it there in November and March, which may indicate migration even farther south. It is in fact a common winter visitor in many parts of East Africa (Kenia). The southernmost record is for the Seychelles (Hartert, 1920a). Westward we have records for Wadelai and the Ruwenzori region of Uganda (Emin, 1891; Ogilvie-Grant, 1910), and Mr. J. P. Chapin writes me that in 1913 from November 20 to December he saw a flock at Avakubi, on the Ituri River, northeastern Congo. Eastern Africa

Somaliland Red Sea

On the northeast coast of Africa specimens have been taken in Italian Somaliland (Salvadori, 1894) and in Eritræa (Zedlitz, 1910). Very likely it may be found along both coasts of the Red Sea, for it has been taken at Suez (Boyd, 1917) and in Arabia Petræa; is common at Huswah and Aden (Barnes, 1893), and is known from Al Khaur, in the Wadi-Hassan region (Ogilvie-Grant, 1900). It winters to some extent in Palestine (Tristram, 1884;

Asia Minor

S. Merrill, 1903) and in Cyprus (Bucknill, 1911), as well as throughout Asia Minor. G. C. Taylor (1872) found it at Constantinople, while Abbott (*fide* Dresser, 1871–81) took it at Trebizond, and Dickson and Ross (1839) have recorded it from Erzerum. The British Museum possesses specimens from Bagdad and from Fao, and Stoneham (1919) has recorded a specimen taken at Daur, Mesopotamia. In the Caucasus the Garganey may winter in the southern parts. Radde (1884) speaks of it as occurring at Lenkoran in February, and E. von Middendorff (1891) saw great flocks of Garganey off Apsheron Light, near Baku, on December 31. According to

Persia

Zarudny (1911) it winters in northwestern Persia in small numbers, but is in most other localities chiefly a bird of passage. Only in the Seistan region is it abundant in winter. Hume and Marshall (1879) state that it is not uncommon in winter in Afghanistan and Baluchistan and that specimens have been obtained in the cold season on both coasts of the Persian Gulf. They do not give the authority for this statement, but it seems probable enough. The bird

India

is found throughout India in the winter, extending throughout the Himalayas from Kullu to Nepal and from there south to Ceylon. Longitudinally it winters all the way from the Punjab and Sind eastward. In Oudh, the Northwest Provinces and Sind it is exceedingly abundant, excepting in midwinter, when most of the Garganeys go still farther south (Hume and

Ceylon

Marshall, 1879; Baker, 1908). In Ceylon it is found only in the northern parts (Legge,

Burma

1880). It is a common species in Burma, Tenasserim and Pegu, especially between the Sittang and Salween Rivers (Baker, 1908), but is less common in Arakan (Hopwood, 1912), though particularly abundant in the South Shan States (Bingham and Thompson, 1900; Rippon, 1901).

Throughout China the Garganey is almost exclusively a bird of passage. A few specimens have

China

been taken in Formosa in winter (R. Swinhoe, 1863; La Touche, 1907; Uchida,

Japan

1912), and a few spend the winter in southern Japan (Seebohm, 1890). But the real wintering area of the Garganey is much farther south. It unquestionably winters throughout the entire Malay region. It has been recorded from the Ratburi region and it is said to be abundant there (Gairdner, 1914), but seems to be most common on the coast of the Gulf of Siam (Gyldenstolpe, 1916). The British Museum has a specimen from Cochin-China. It must be confessed that there are few specific records for the Malay Peninsula, but it has been taken at the mouth of the

East Indies

Perak River (H. C. Robinson and Kloss, 1921). It is common in parts of Sumatra (Vorderman, 1890; Snelleman, 1887; H. C. Robinson and Kloss, 1918), and it is known from Java (Koningsberger, 1915; Müller, Leyden Museum). Nicholson (1883) took a specimen in northwestern Borneo, and the Sarawak Museum has specimens from three different localities in the same general region. Other specimens have been taken on Calayan and Luzon in the Philippines (R. C. McGregor, 1909), and at Lake Limbotta, Celebes (Meyer and Wiglesworth, 1898). Still farther east the Garganey has been found in the Sulu Islands (Hartert, 1897), on Ternate (Salvadori, 1882) and on Ceram (Wallace, British Museum). Recently a flock of eight was seen on the Kapare

New Guinea

River in Dutch New Guinea (Ogilvie-Grant, 1915). Two specimens shot at Connewarre, Victoria, Australia, in March and April, 1896, *seem* to have been wild birds (Mathews, 1914–15).

Passage Area

Since the breeding and wintering grounds of the Garganey are so widely separated, the passage area is naturally a large one. The species is not really a characteristic one of western Europe, but the

whole of this region is touched, primarily during migration. This is true of France and the Low Countries especially, and to a lesser extent of Switzerland and what was formerly the Dual Monarchy. It might even be said of all the Mediterranean lands, for even in northwestern Africa the Garganey occurs chiefly on passage. In the basins of the Black and the Caspian Seas it is more of a breeding species, and this applies also to Russian Central Asia. It is impossible to say whether it ever nests in the great Mongolian and Tibetan deserts, but I think it probable that it does so in limited numbers. Still, the whole of this great waste region is an area of passage, and to this, China proper must be added, for there is no direct evidence that the Garganey ever nests or winters there. The longer one deals with the literature on this species the more convinced one becomes that the real wintering grounds are in central Africa, in India, and in the ornithologically little-known islands of the Malay Archipelago.

Migration

I have already had occasion to mention the Garganey's extreme sensitiveness to seasonal change. We need not be surprised, then, to find it starting south early in the autumn and returning rather late in the spring. It seems also to have a strong inclination to linger on the way, so that the journey from the breeding to the wintering grounds may cover a considerable period of time. From what meager information we possess, it would appear that in the autumn it is more likely to migrate along the river routes than along the coasts, and all over western Europe it is a spring passenger, rare in the autumn. It seems to go south by a different route as do some of the migrant ducks in North America.

It is very difficult to give representative migration dates without going into more detail than space allows. In the Mediterranean lands the species appears rather early as compared with more northern countries. Whereas in the former (Egypt, *e.g.*) they often arrive by February, yet they rarely reach central Europe (Germany) before late March and April. March 16 was the average date of arrival in Hungary for the years 1895–1911 (Aquila, vol. 14, p. 112, 1907; vol. 19, p. 144, 1912). In the autumn they begin to leave northern and central Europe as early as August, and most have disappeared by October. They pass through Egypt in October and November, but do not reach central Africa until November. In Nigeria they are said not to appear until January.

Similar conditions obtain in Asia. While the birds leave India from February to March, they do not pass through Turkestan until April. In autumn they appear in northern India as early as late August or early September, but then they begin to linger, not reaching Ceylon until November, or even December. In January and February they are rare in northern India. In the Far East they appear in southern China in February and are then seen until April. They reach Ningpo in great numbers in March, the lower Yangtse in April and Lake Hanka in May. In autumn the migration seems to be more inland, and the species is then very abundant in Tibet.

A few migration observations made from lighthouses may be of interest (E. von Middendorff, 1891).

Shishgin Light, White Sea — several flocks, September 22, 1885; last ones October 8.

Apsheron Light, Caspian Sea — common autumn migrant in 1886. First ones October 6; big flocks December 31.

Derbent Light, west Caspian Sea — common migrant in spring of 1886. Forty seen March 29 and others up to April 11.

Odessa Light, Black Sea — two killed at light at 12 P.M., August 19, 1888, during north-northeast storm.

A male recorded by Hartert (1921) was taken in the central Sahara south of Asben on August 20, 1920, suggesting one of the migration routes to Nigeria. Hartert suggested that this bird might have remained in Africa during the summer, but may it not just as well have been an early autumn migrant?

GENERAL HABITS

THE Garganey shows, of course, some points of resemblance, not only in appearance, but also in habits to the American Blue-winged Teal; and its affinities with the Shoveller have often been the subject of comment. It may be thought of as having something in common with the latter, though but little with the European Teal.

HAUNTS. There is not much that is characteristic about its mode of life. It is a true shoal-water duck, and in its summer habitat selects localities like those chosen by the Shovellers, where it can feed in sheltered, shallow, stagnant waters, which appeal to its rather retiring nature and to its love for animal food. As Millais (1902) points out, it is very much less marine than the European Teal, and as its southern wintering grounds are well out of the frost belt it is not necessary for it to resort to the coast for food. In the Mediterranean countries it will, however, resort to brackish estuaries like the Rhone delta and to the brackish lakes of Algeria (Millais, 1902), while in India and Ceylon it seems to be commonly found on salt-water creeks and on the shallower parts of the coast (Hume and Marshall, 1879; Legge, 1880; Baker, 1908).

WARINESS. The opinions of naturalists and sportsmen vary so greatly on this point, that without personal experience it is very difficult to make an intelligent comparison. In western Europe writers seem to be generally agreed in calling it a rather tame bird, apt to be seen about dwellings (Naumann, 1896–1905), and I have always supposed that it was similar to our Blue-wing in this respect. The only flock of these ducks which I ever had the opportunity to observe, was on spring migration at the head of the Gulf of Akaba, Red Sea. These birds acted in a very unsuspicious way and circled after being shot at. This was on April 17 and they were no doubt already mated. Sjöstedt (1910), on the other hand, found them pretty cautious in central Africa. According to Hume and Marshall (1879) they were never very tame or familiar in India, but at the same time they were not very wild or wary. Yet in Lucknow they are spoken of by Jesse (1903) as wilder than the Common Teal. Baker (1908) even goes so far as to say that he has found this one of the wildest of the duck tribe in India, and he gives good reasons for this opinion. Of course most of the other species of ducks are somewhat tamer in the East than in the West, but the relative wildness in India is interesting, and may be accounted for simply by the fact that they go about in larger flocks; and as a rule the larger the flock the wilder the individuals.

DAILY MOVEMENTS. Not different from those of other shoal-water ducks.

GAIT, SWIMMING, DIVING. These are strictly surface-feeders and they do not "tip" as much as Mallards. The flocks pack together more than most ducks, and this is true both when they are feeding and when they are on the wing (Baker, 1908). The same is characteristic also of our Blue-winged Teal (*Anas discors*). On the water the males are easily distinguished from other ducks, but the females can only be told from those of the Common Teal at close quarters if one can see the light-colored superciliary stripe, the white spot at the base of the bill, or the more immaculate throat. The habit of swimming around in close circles, common also to the Shoveller, an action doubtless useful in stirring up water insects, is frequently seen with the Garganey. They dive only when wounded.

FLIGHT. The flight of the individual bird is almost noiseless, although large flocks cause a "surging hiss" or rushing sound, likened by Hume and Marshall (1879) to the hurtling sound of heavy round-shot. They rise from the water a little less perpendicularly than do Common Teal, and their flight is as rapid, though not quite so erratic or twisting as that of the latter. In western Europe, where they are by no means a plentiful species, they are seen in pairs or small flocks, but in the wintering areas such as the Mediterranean countries and India, large flocks are very common. Baker (1908) tells us that in northwestern India these flocks average perhaps one or two hundred, but in eastern India they seem to be somewhat smaller, running from about fifty to a hundred. Small flocks of from five to ten are rare there. A great flock, noted by Hume and Marshall (1879) on August 28, 1865, at Rahun, was estimated to contain 20,000 individuals; they say they never before nor after saw so huge a body of fowl of one kind. On migration the flocks of Garganeys fly high and assume the formation characteristic of other shoal-water ducks.

ASSOCIATION WITH OTHER SPECIES. The Garganey is a gregarious and rather social bird, but perhaps less so than the Common Teal (Naumann, 1896–1905). They mingle freely with other Teal and sometimes with Mallard or even larger species of water-birds. There are, however, a few notes in the literature suggesting contrary tendencies.

VOICE. These are more silent birds than the Common Teal, resembling our own Blue-wings. The only time I ever heard the note was from a male in confinement in Washington, on May 5. This note, which is very hard to describe, is a low rattle or creak, consisting of four or five syllables and accompanied by a sudden raising of the head. Occasionally a single very low note was uttered, sounding like *tick*, and audible for only a few yards. These sounds of course were the notes of the male during display, and as a matter of fact it seems that the male's voice is rarely heard except in the breeding season. This note has been variously described, and was aptly com-

pared by Rogeron (1903) to the sound produced by passing a wooden ruler over the teeth of a coarse comb. It is constantly uttered during courtship. At least two such reliable observers as Naumann (1896–1905) and Baker (1908) have distinctly said that in autumn and winter the male utters a note which is the same as the *knäk* of the female; but I cannot reconcile myself to the belief that any of the northern surface-feeding ducks have a note common to both sexes, excepting in the first months of life. Possibly the young male does not get his fully developed voice until late in the first winter.

The note of the female, as already stated, is a *quack*, less loud, but in a higher key than that of the Mallard, and this note has given it the German name "Knäkente." Little chattering notes, which are not call-notes, are common to both sexes, as in other ducks.

The trachea of the male is about 180 mm. long and is very distinctive, quite unlike that of any related species. The diameter of the tube increases in size toward its lower end and merges into a large oval tracheal pouch which faces forward and is not left-sided or transverse like the *bulla ossea* of most ducks. The tracheal tubes spring from the inner flattened surface of this pouch, and not from below it, as in many species.

Food. It is difficult from the scattered observations to make any fair comparison between the diet of Garganeys and that of other Teal. They are chiefly vegetable feeders, but at the same time a great deal of animal food is taken, particularly on the breeding grounds in northern Europe. Millais' (1902) statement that they feed largely on small fish and aquatic insects must be based on observations made under exceptional conditions. Nevertheless so many writers have spoken of their rather inferior flesh, that the conclusion is almost forced upon one that the species is less of a vegetarian than the Common Teal, and perhaps even more of an animal feeder than our own Blue-wing (*Anas discors*). Naumann (1896–1905) included among the food, insects, insect larvæ and all kinds of small worms, tender roots, sprouts and leaves, seeds of all kinds of water-plants, earthworms, snails, very small frogs and frog spawn, and occasionally very small fish and fish-spawn. Stomachs examined by Jäckel contained snails (*Planorbis hispidus*), leeches (*Haemopis vorax*), water-bugs (*Naucoris cimicoides*), caddis-fly larvæ and their cases, and various water-beetles (*Parnus*, *Hydrobius*, *Cyclonotum*), in addition to seeds of pond-weeds, rushes, sedges, manna-grass, pond-lilies, smart-weeds, dock and water crowfoot (*fide* Naumann, 1896–1905).

In India, according to Hume and Marshall (1879) they also feed on wild and cultivated rice, and those on the seacoast consume shrimps, delicate shells and other animal substances. Stomachs of two birds shot in India in April contained small shells (*Planorbis*) and bulbous water-weed roots, besides other snail shells, bivalves

and parts of leguminous weeds (Mason and Lefroy, 1912). It would not be surprising if on careful analysis the autumn and winter food was found to contain 30 to 40% animal substance and the summer food 60 or 70%.

COURTSHIP AND NESTING. The display is very different from that of the Mallard, Teal or Pintail and closely resembles that of the Shoveller. All that I myself saw was a simple raising and lowering of the head on the part of the male, but Wormald (1914) says that the male frequently throws the head backward and forward as well as up and down, at the same time uttering his well-known crackling note, acting therefore similarly to our Blue-wing, except for the note uttered. He goes on to say that this species and the Shoveller have another habit in common — that of "swimming in circles round and round, the bills of both male and female being partly submerged in the water just behind and below the tail of the other." He is not positive that this is a courtship performance, but he saw it only during the spring of the year. Millais (1902) describes the same curious spinning trick, and has little doubt that it is part of the display. It seems to me that this is doubtful, for it is a very different action from the typical displays of the surface-feeders and can be better explained as a feeding trick.

Mating flights, which are common on the breeding grounds, are the same as those seen in other surface-feeding ducks. They were well described long ago by Naumann. That writer also noticed that many birds arrived on the nesting grounds unpaired, and these he presumed to be young of the previous year. There seems to be an idea prevalent that the young Garganeys do not breed till the second year, but though there may be many individual cases of this kind it seems to me hardly possible that it is the rule with this or any other species of surface-feeding duck. Hand-reared stock has often bred when only one year old.

The nesting season is early, considering the late migration of this bird, but as a matter of fact there are not many nesting dates to be found, and one cannot get a very exact idea of the average time of laying. In western Europe the breeding season is in late April and early May. No doubt it is somewhat later in eastern Europe and Siberia. A nest was found by Bucknill (1911) in Cyprus on May 14. In Bulgaria a female was shot from a nest with highly incubated eggs on June 3 (Reiser, 1894).

The Garganey is not at all particular about the nesting locality. In southern and western Tibet it has been found at altitudes of over 15,000 feet (Walton, 1906; Parrot, 1909) and at high altitudes in Turkestan and Pamir (Lansdell, 1885). The nest itself is placed in a variety of situations, sometimes almost in the water, at other times at a considerable distance from water, on high, dry ground. Not infrequently it is placed in the woods near some forest swamp. There is nothing noteworthy about the nest itself, excepting that it is usually very well concealed, and often arched over by surrounding vegetation.

The clutch is large, varying all the way from six to fourteen eggs, the average being eight or nine. The eggs are rich cream to brown-cream in color, with very little if any suggestion of green. They are hardly distinguishable from those of the Common Teal, though they are more yellow (Millais, 1902). They vary in size from 39.3–48 by 29.4–33 mm., the average being 44.96 by 32.48 mm. (Hartert, 1920a). The nest-down is very distinctive: blackish brown or sepia with white centers and conspicuous white tips (A. C. Jackson, 1918).

The incubation period, Naumann (1896–1905), after careful observation, found to be twenty-one to twenty-two days, and W. Evans' (1891) investigations gave the same result; but Heinroth (1908) states that it is about twenty-four days. There is little information regarding the behavior of the males during this time, but Naumann says they stay in the close vicinity of the nest for some time before they flock together to moult. There can be no question whatsoever about their desertion of the female early in the incubation period.

STATUS. The Garganey has apparently never been at all a plentiful species in western Europe or eastern Asia. The center of abundance lies in the eastern Mediterranean and extends as far as India and central Asia. Figures for the old decoys are of no value because both species of Teal were thrown together. It appears, however, that in the Ashby Decoy, Lincolnshire, during the years 1833–68 only twenty-nine Garganeys were taken, all of which were captured in the month of April (Cordeaux, 1896). The practical absence of the Garganey in English decoys is partly due to the fact that they leave for the south before the decoys begin working, and arrive on the breeding grounds after the decoys have closed. In Millais' (1902) opinion the supposed increase of the Garganey in the British Isles has been greatly exaggerated. He thinks that in Norfolk, the chief breeding ground, fewer nests are found each year. In 1900, he estimated the number of nests in that county at not more than fourteen. Other English sportsmen and naturalists have told me that this Teal is certainly decreasing at the present time.

A good idea of the comparative abundance of the Garganey in Germany may be derived from Naumann's statement, made about a century ago, that this Teal was little if at all more numerous than the Gadwall. According to Ternier and Masse (1907) it is becoming more and more rare in France, and local observations in southeastern Hungary also point to considerable decrease since 1850 (von Buda, 1906). Even in southern Russia, which is one of the great breeding areas, Radde (1854) found it a less common bird than the Common Teal during the summer in the Crimea. But in Montenegro it is said to be more abundant than the Common Teal on passage (Reiser and von Führer, 1896).

For Africa the following notes are of interest: In Constantine Province, Algeria, it is much more rare than *Anas crecca* (Taczanowski, 1870), but in northern Nigeria,

which is south of the regular winter range of the Common Teal, the Garganey is the more abundant species (Hartert, 1886). In East Africa, on the White Nile, Jägerskiöld (1904) during early April found it not common, much less plentiful than the Common Teal. Perhaps it becomes more common there as the season advances.

The enormous numbers of Garganey found in India in Hume and Marshall's (1879) time have already been mentioned, but Baker (1908) fears that such tremendous flocks as Hume saw are now a thing of the past, although flocks of thousands are still seen.

Enemies. The enemies are the same as those already mentioned in connection with the Common Teal and the Mallard.

Damage. Only in India does this species occur in large enough numbers to do much damage. Hume and Marshall (1879) say that in parts of India they came to the paddy-fields at night in such large flocks as to destroy acres of crop at one visit. Whether they are really a factor of importance to-day I do not know.

Food Value. The flesh of the Garganey is everywhere graded lower than that of the Common Teal. It is more apt to have a rank and bitter taste, especially in the spring. Naumann considered it a very good bird for the table in the autumn, but Millais (1902), speaking of birds from the Rhone delta and the brackish lakes of Algeria, classed them as very inferior. Hume and Marshall (1879) did not think them comparable to the Common Teal, and say that even the inland feeders are not always free from a "certain marshy twang."

Hunt. Garganey are taken in the spring with the Pintail by the French hut-shooters. Huts are also used in Bulgaria (Reiser, 1894). In India they are taken in the great boat-drives described by Baker (1908). When shooting over the great Jessore *bheels* with a thin line of boats, Baker found the Garganey acting very differently from the Teal. They "rose far ahead, swept around but once in a wide semi-circle, and then went straight ahead, whereas the Common Teal often dodged in and out along the whole line, circled about two, three, or more times, and then disappeared, but often only to settle half a mile or so further on." Hume (Hume and Marshall, 1879), who imported a Norfolk punt and swivel-gun into India, tells of having made an enormous shot, knocking over sixty birds from a huge flock of some 20,000. Great numbers have been shipped from China to European markets (Ghidini, 1911).

Behavior in Captivity. This species has been favored by amateurs since an early date. It appears on the list of water-fowl kept by the great Condé at Chantilly

in 1663 (Loisel, 1912) and also has a place in the earliest lists of animals kept by the London Gardens (P. L. Sclater, 1880). Although by no means a free breeder in captivity (it bred only twice in the London Gardens previous to 1880), it has nested in the ponds of Mr. Wormald (*in litt.*), of Earl Grey (*in litt.*), and of Mr. St. Quintin (1909). It has been one of the favorites with aviculturalists and easily obtainable in the bird markets for from 25 to 30 shillings the pair, while hand-reared stock brings a somewhat higher figure. It is a fairly hardy bird, and long-lived. Forty-three specimens kept in the London Gardens lived three years and nine months on the average, the maximum being thirteen years and eight months (P. C. Mitchell, 1911). Mr. Wormald's earliest date for laying in Norfolk, England, was May 8.

Mr. St. Quintin (1909) tells of an interesting experience he had in breeding these ducks. From a wild nest he took eight eggs and reared six young from them. A female Garganey which he had had for some time was provided with a mate in the spring of 1908. On May 19 the male was driven off by a wild drake of the same species which suddenly appeared and paired with the pinioned female. This alliance resulted in a nest from which four young were hand-reared. By June 12 the pinioned duck was again sitting, and the wild mate had disappeared. This wild male was apparently the father of both broods. The observer noted that the wild drake was beginning to go into eclipse on May 27, which is an exceedingly early date for any duck, and for this species must be exceptional.

Garganeys were very commonly imported into this country before the Great War and about one hundred were again brought in in 1919–20. The old prices varied from $12.00 to $15.00 the pair, but at present I suppose the price must be almost double what it was. Mr. Cook of Long Island (New York) seems to be the only one to have bred the species in this country. The only ones which I ever kept, a pair or two at the most, did not breed, as they were kept with other and larger ducks. All Teal should of course be separated in enclosures by themselves, and hand-reared stock should be purchased when obtainable.

Hybrids. Crosses between the Garganey and other species are not uncommon. Poll (1911) lists crosses with the following species, all apparently killed in the wild: European Widgeon, Common Teal, Pintail, Common Pochard and Tufted Duck (*Nyroca fuligula*). In confinement the Garganey has been crossed with the Common Teal, Shoveller (*Spatula*) and Carolina Duck (*Lampronessa*) (Poll, 1911; Wormald, 1914).

BLUE-WINGED TEAL

ANAS DISCORS LINNÉ

(Plate 48)

SYNONYMY

Anas discors Linné, Systema Naturæ, ed. 12, vol. 1, p. 205, 1766.
Querquedula discors Stephens, General Zool., vol. 12, pt. 2, p. 149, 1824.
Boschas discors Swainson, Classification of Birds, vol. 2, p. 367, 1837.
Cyanopterus discors Eyton, Monograph Anatidæ, p. 131, 1838.
Pterocyanea discors G. R. Gray, Genera of Birds, vol. 3, p. 617, 1845.
Cyanopterus inornatus Gosse, Birds of Jamaica, p. 402, 1847.
Pterocyanea inornata G. R. Gray, Genera of Birds, Appendix, p. 28, 1849.
Querquedula inornata March, Proc. Acad. Nat. Sci. Philadelphia, 1864, p. 71.
Querquedula discors albinucha Kennard, Auk, vol. 36, p. 459, 1919.

VERNACULAR NAMES

English: Blue-winged Teal, Blue-wing, White-faced Teal, Summer Teal, Mexican Duck.

German: Blauflügelige Krickente, Blauflügelige Streitente.

French: Sarcelle à ailes bleues, Sarcelle soucrourou, Sarcelle soucrourette, Sarcelle de Cayenne, Sarcelle de Mexique, Sarcelle autonnière (Louisiana), Sarcelle printannière (Louisiana), Cercelle.

Dutch: Blauwvleugeltaling.

Spanish: Zarceta de invierno, Zarceta de stoño, Pato de la Florida, Patillo.

Mexican: Toltecoltl, Metzcanauhtli.

Guatemala: Azulejo.

DESCRIPTION

ADULT MALE: Top of head, a strip along the base of culmen and chin, black. A conspicuous white crescentic mark extends from over the eye to the side of the throat, bordered behind by a blackish band. Remainder of head and upper neck dull lead color, glossed with vinaceous along sides of occiput. Mantle and scapulars dusky marked with irregular buff-colored sub-terminal bands. Back, rump, upper tail-coverts and tail nearly uniform brownish black. Upper breast ruddy buff thickly marked with rounded spots, smaller anteriorly. Remainder of lower parts rusty buff-color, more or less spotted, except the under tail-coverts which are black. Flanks broadly barred with dark brown and on each side of rump a prominent white area. Lesser wing-coverts and outer webs of outer scapulars pale sky-blue; greater coverts broadly tipped with white forming a white anterior wing-bar. Speculum metallic green, the tips and inner webs of secondaries dark brown. Primaries dark brown,

under wing-coverts bluish and brownish, with the central area and the axillars pure white. Tertials long, pointed and with a narrow central shaft-stripe of buff-color.

Iris dark hazel. Bill bluish black. Legs and feet dull yellow to yellow-orange, webs dusky, claws brownish black.

Wing 184–194 mm.; bill 39–42; tarsus 42–44.

Weight 12 5 to 15 ounces (0.35 to 0.42 kilograms); probably up to one pound (0.45 kilograms) when in extra-good condition.

Adult Female: Upper side dusky brown, the tips of the feathers edged with grayish and on the mantle irregular buff-colored sub-terminal crescentic bars. Top of head dark brownish, sides of head thickly streaked with brown, chin and throat immaculate buff. Lower parts white to buffy white more or less spotted and streaked, the spotting darker on the upper breast and on the under tail-coverts. Lesser wing-coverts as in the male but white band on greater coverts very narrow and irregular. Speculum dull greenish to bronze color. Tertials lacking a prominent central buff stripe but sometimes long, well developed and slightly iridescent.

Iris hazel. Bill greenish dusky. Legs and feet of a duller yellow than those of male

Wing 175–182 mm.; bill 38–40; tarsus 39–42.

Weight 10.5 to 13 ounces (0.29 to 0.36 kilograms).

Immature Females in early autumn plumage may be recognized by the uniform grayish mantle coloring, and the absence in that region of any buff barring, characteristic of the adult female. Streaks and spots on lower parts somewhat smaller and paler.

Immature Males in early autumn can only be told from the young females with certainty by the much richer metallic green of the speculum and the more prominent white bar on the greater coverts.

Male in Eclipse Plumage never becomes exactly like the female and does not entirely lose the crescentic white face-patch until late summer, although this becomes very obscure. Sides of head are dull colored and more streaked than in the female, and lower surface may have some indication of cross-barring; or it may be almost as in the female. Wing as in full-plumaged males. Full eclipse is assumed rather late in summer, and carried well into September and October, so that old males in early autumn are only to be distinguished with certainty from young ones by the barring of mantle, darker throat, absence of finely streaked abdomen and the longer, fresher-looking tail-feathers.

Young in Down: Almost exactly like young of Mallard and probably not to be distinguished from it except by the smaller size and more delicate bill. At two weeks old the young begin to lose the bright sulphur-yellow color of the under parts, just as young Mallards do.

Note: A subspecific race based upon the posterior extension of the white crescentic face-patch to the nuchal area was described by Kennard from Louisiana (Kennard, 1919). The type specimen was taken not later than April 2 and may not have been a southern breeding bird. Some spring specimens in the U S. National Museum (nos. 87,613 and 190,967 from California and from Gainesville, Virginia) show white streaks on side of pileum, or white nuchal patches so that I doubt if this is a constant character. Not all of Mr. Kennard's specimens show the character strongly marked and some of them may have been migrants on their way north. Mr. S. C. Arthur (1920) shows that the white lines on the heads of male Teal are not always constant from plumage to plumage. Nevertheless the characters to which Mr. Kennard called attention seem to be commoner in the southern breeding group than in northern migrants and may indicate the beginning stage in the formation of a new race.

CINNAMON TEAL

Female Male

BLUE-WINGED TEAL

Male Female

DISTRIBUTION

In general, North America from Gulf of St. Lawrence, Great Slave Lake and southern British Columbia to Central America, West Indies and northern South America.

Breeding Range

The Blue-wing breeds in central North America, and is a more southern nester than most other shoal-water ducks. It is a rare breeder west of the Rocky Mountains and east of the Appalachians. Neither the northern nor the southern limit of the breeding range is well defined.

Alaska

According to Dall and Bannister (1869) it is a rare bird near Fort Yukon and at the mouth of the Yukon, Alaska. They tell us that Captain Everett Smith took eggs near Cape Romanzoff. L. M. Turner (1886) has recorded it from Atka Island in July, but Nelson (1887) did not come across it in the four years he spent in Alaska. There is certainly not sufficient evidence of its breeding or even occurring in Alaska.

Northern Canada

In Canada the species seems to straggle as far north as Fort Simpson (U.S. National Museum) and it is known to have bred rarely at Fort Providence and about Great Slave Lake (Ross and Kennicott, *fide* Preble, 1902; MacFarlane, 1908). Rae (British Museum) seems to have taken a specimen as far north as Repulse Bay! Farther south the species is still uncommon, though a regular breeder about Lake Athabasca (Harper, MS.), but it seems to be more common on the Peace River and Little Slave Lake (Spreadborough, *fide* J. and J. M. Macoun, 1909).

British Columbia

In British Columbia it is a rare breeder, excepting at a few points in the south, as on the lower Fraser (Brooks, *fide* J. and J. M. Macoun, 1909), at Cariboo (A. Brooks, 1903) and Lac la Hache (Rhoads, *fide* J. and J. M. Macoun, 1909) and Midway (Spreadborough, *fide* J. and J. M. Macoun, 1909).

Alberta

Saskatchewan

East of the Rockies it is abundant as a breeder in Alberta, especially in the south and at Edmonton (Spreadborough, Dippie, *fide* J. and J. M. Macoun, 1909; W. S. Brooks and Cobb, 1911; Soper, 1918). It is equally common in southern and central Saskatchewan (Nutting, *fide* Preble, 1902). Buchanan (1920) met with it along the Beaver and Churchill Rivers and northeast even beyond Lac du Brochet, but many of these northern records are for non-breeding stragglers. Bent (1907) found it common in southwestern Saskatchewan and Ferry (1910) has recorded it for Prince Albert and Quill Lake. Western Manitoba is, perhaps, the center of abundance during the breeding season. The species is very plentiful there in the nesting season and there are breeding records for all parts of the Province (E. E. Thompso. 1891; Taverner, 1919).

Eastern Canada

East of Lake Winnipeg there are very few breeding records for Canada. In Ontario a few still breed about Lake St. Clair and Mohawk Point (MacIlwraith, 1894; Saunders, *fide* J. and J. M. Macoun, 1909), at Long Point, Lake Erie, and about Ottawa (C. W. G. Eifrig, 1910). Possibly a few breed about Montreal (Wintle, 1896) and Toronto (U.S. Biological Survey) and in Quebec (Dionne, 1906). Chamberlain (1882) states that it is a common summer bird in New Brunswick, but this claim is not supported by other observations except that Cooke (1906) stated that it had nested in King's County and St. John County. Brewster (1884) says a few nest on Anticosti Island. On the Magdalens it seems to have been rather common as a breeding bird (Cory, 1878; Job, 1902), but Mr. Job on a recent journey saw none there. There is no clear evidence of its ever having bred in Labrador proper where it is very rare in summer in the north (C. W. Townsend and Allen, 1907). J. and J. M. Macoun (1909) report a pair "evidently breeding," observed at Clearwater Lake, western Labrador, July 11, 1896. Cooke (1906) is authority for the statement that it has bred rarely in Newfoundland and Nova Scotia and at one time it may have been a common

nester in the latter Province, although I rather doubt this. Coburn's (1912) statement that he found the species nesting in Iceland need not be considered, as his statements are unreliable.

New England

In the eastern United States the Blue-wing is a rare breeder. In Maine it is said to have bred in Washington County (O. W. Knight, 1908), but there is no evidence of its ever having done so in New Hampshire. It seems to nest rarely in Vermont about Lake Champlain (G. H. Perkins and Howe, 1901; Forbush, 1912; L. C. Clark, Jr., *in litt.*). It has been taken near Cambridge, Massachusetts, in late June and may possibly have bred (G. M. Allen, 1909). It has certainly bred at Sakonnet, Rhode Island (R. H. Howe and Sturtevant, 1899) and may have nested in Connecticut at Quinnipiac Marsh, where it was found on July 26 (Sage, Bishop and Bliss, 1913). In eastern Virginia, according to a letter from Mr. J. W. Whealton, it has been seen in midsummer, and has been reported nesting at Elliott's Isle, Dorchester County, Maryland.

New York

The Blue-wing is not an uncommon breeder in New York State and has been recorded nesting on Long Island as well as in various other localities. In the Lake region of western New York and about Lake Erie it has been repeatedly found (Eaton, 1910; U.S. Biological Survey notes). There are no breeding records for Pennsylvania, but the species undoubtedly nests occasionally in the western parts. The only breeding records for Ohio are for the northern districts, notably Port Clinton and Sandusky (L. Jones, 1903; Cooke, 1906). In Indiana it is known to have bred locally as far south as Gibson County and Wheatland (A. W. Butler, 1898; Cooke, 1906). In Michigan, on the other hand, especially about the St. Clair Flats it is a common summer resident and breeding bird (Barrows, 1912; and others) and in Illinois it also breeds sparingly throughout (Cory, 1909). It appears to be a not very common breeder in Wisconsin (Kumlien and Hollister, 1903; U.S. Biological Survey notes).

Ohio

Michigan

Illinois

Wisconsin

West of the Mississippi it is a common breeder as far as the Rocky Mountains. It is abundant in Minnesota (Hatch, 1892; Roberts, 1919; Cahn, 1922), in North Dakota (Bent, 1901–02; and others) and South Dakota (McChesney, 1879; Visher, 1909), in Montana (A. A. Saunders, 1921) and in Wyoming (Grave and Walker, 1913; Cory, 1897). In Iowa this Teal breeds rather commonly in certain sections (R. M. Anderson, 1907; Tinker, 1914) and many still breed in Missouri (Widmann, 1907). It is a common nester also in the sandhill region of western Nebraska (Oberholser, 1920) and is greatly increasing as a breeder in the northern half of Kansas (H. Harris, 1919). In Colorado also it is known as a breeding bird, especially at Barr Lake (W. L. Sclater, 1912).

Western States

West of the Rockies it is an exceedingly rare breeder. There is one record of its having bred at Mabton in western Washington (U.S. Biological Survey) and three records for Oregon (*idem*), but there is no evidence of its ever having nested in California, although it has been seen there in summer. A few nest in Idaho (Rust, 1915; U.S. Biological Survey) as also in parts of Nevada (Cooke, 1906), and a few breed in Utah (Cooke, 1906; Wetmore, 1921). Mearns (1890) met with the species in summer in the Mogollon Mountains, Arizona, and it has been found nesting in various parts of New Mexico (F. M. Bailey, 1904a; Cooke, 1906; Wetmore, 1920). In Oklahoma the species has bred at Fort Reno (Cooke, 1906), and though there is no evidence of its ever having nested in Arkansas there is no doubt that it breeds, or at least did breed, in the whole Mississippi Valley (Goss, 1891). A certain number stay in Louisiana to nest (Kennard, 1919; U.S. Biological Survey notes) and there is good reason to suppose that some nest in Florida. Moore (*fide* Baird, Brewer and Ridgway, 1884) thinks it does so about Lake Okeechobee or on the islands. He saw them near Sarosta all the year and killed young on Miska Lake in September. Mr. Harper (U.S. Biological Survey) was told that some nest near Zellwood, Florida.

Florida

In Texas the Blue-wing has been found nesting on the Nueces River, near the Bexar County line (Beckham, 1888) and near San Antonio (Attwater, 1892), Hereford (Oberholser, U.S. Biological Survey) and Spring Lake (Cooke, 1906). No doubt it breeds also in Kerr

Texas

MAP 62. Distribution of Blue-winged Teal (*Anas discors*)

Breeding range, dotted line; winter range, broken line

Sporadic record indicated by cross (×)

County, where it has been seen all summer (A. P. Smith, 1916). The species has been taken as late as May 17 at the tip of Lower California (Brewster, 1902) and Grayson (Lawrence, 1874) thinks that some must nest in western Mexico about Mazatlan, where he saw them throughout the summer. Leyland (Moore, 1859) found it nesting as far south as Omoa, Honduras! March (1864) speaks of it as resident in Jamaica, and in the Grenadines it is known to have nested on Isle Rhonde, and it probably breeds also on Carriacou (Wells, 1887; Clark, 1905; P. R. Lowe, 1911). Ramsden (1910) found specimens near Guantanamo, Cuba, on June 12.

Mexico

Honduras

West Indies

Winter Range

The Blue-winged Teal winters far south, in most cases south of the southern parts of its breeding range. According to Cooke (1906) a few winter in the West as far north as British Columbia, but I find no published evidence to substantiate this. It is not known to winter in Washington or Oregon and even in California it occurs only casually chiefly in the south (Grinnell, Bryant and Storer, 1918). A few winter in Arizona (Swarth, 1914) and possibly in New Mexico. It is a common bird in Texas (Strecker, 1912), and is very abundant on the Gulf Coast of Louisiana (Beyer, Allison and Kopman, 1907), where I have seen hundreds of thousands in January. Only a few winter as far north as Arkansas in mild winters (Howell, 1911).

British Columbia

California

Gulf States

I do not believe that it winters regularly in the Mississippi Valley, though Ridgway (1895) says it occurs in Illinois, and Cooke (1906) makes a similar statement in regard to southern Indiana. It is very common on the Gulf Coast, in Mississippi, Alabama (Golsan and Holt, 1914) and in Florida (Scott, 1888, 1892; Cory, 1896; R. W. Williams, 1904). On the Atlantic coast it winters commonly as far north as South Carolina (Wayne, 1910), and in very small numbers in North Carolina (Club records at Currituck; T. G. Pearson, C. S. and H. H. Brimley, 1919), the Virginias (Rives, 1890); still more rarely in Delaware (Rhoads and Pennock, 1905), or even New Jersey (W. Stone, 1909).

South-eastern States

A few of these Teal occasionally winter in Bermuda (J. M. Jones, 1859), but in the West Indies they are everywhere abundant: in the Bahamas (Cory, 1889; Riley, 1905), Cuba (Gundlach, 1875), the Isle of Pines (Bangs and Zappey, 1905), Jamaica (March, 1864; P. L. Sclater, 1910), Santo Domingo (A. E. and A. H. Verrill, 1909), Porto Rico (Gundlach, 1875; Wetmore, 1916) and the Lesser Antilles: Barbados, St. Vincent, Grenada and the Grenadines (Wells, 1887; Clark, 1905), and on Trinidad (F. M. Chapman, 1894; Hellma 1906).

Bermuda

West Indies

The Blue-wing winters throughout Mexico and has been recorded from Lower California (Brewster, 1902), Sonora (J. A. Allen, 1893), Chihuahua (J. A. Allen, 1893), Nuevo Leon (Sanchez, 1877 78), Tamaulipas (Phillips, 1911; Sanford, Bishop and Van Dyke, 1903), Sinaloa (Lawrence, 1874), Durango (Forrer, *fide* Salvin and Godman, 1897–1904), Jalisco (Dugés, 1869; Sanchez, 1877 78; Beebe, 1905), Colima (U.S. Biological Survey), Guanajuato (Dugés, 1869), Valle de Mexico (Herrera, 1888; Sumichrast, 1881), Puebla (Ferrari-Perez, 1886), Vera Cruz (Sallé, *fide* Salvin and Godman, 1897–1904), Oaxaca (Boucard, *fide* Salvin and Godman, 1897 1904) and Tabasco (Rovirosa, 1887). It has also been found in Yucatan, at Progreso, and on Mujeres and Cozumel Islands (*fide* Salvin and Godman, 1897-1904) and at Chichen-Itza and the Great Cenote (Cole, 1906). In British Honduras it has been met with at Belize (Moore, 1859), and from Guatemala there are records for Acapam, Coban, Dueñas, Santana, Mixtan and Lake Atitlan (Salvin and Godman, 1897–1904; Dearborn, 1907). Leyland (Moore, 1859) found the species at Omoa, Honduras, and G. C. Taylor (1860) met with it in the interior at Yojoa Lake, as well as at Tigre Island and Fonseca Bay, on the Pacific coast. Nutting (1884) found it at San Juan del Sur and Sucuya, Nicaragua, and Richmond (1893) has recorded it from the Rio

Mexico

Honduras

Guatemala

Escondido in the same State. It is said to winter in great flocks on Lake Nicaragua (Rendahl, 1919). It is an abundant bird on the Pacific coast of Costa Rica (Carriker, 1910) and has been found in that country by Zeledon, Cherrie, Calleja and von Frantzius (*fide* Salvin and Godman, 1897–1904). In Panama also it is found in winter (de Armas, 1893; W. Stone, 1918), and is said to be abundant (Jewel, 1913).

Pacific Islands

In the Pacific Ocean the Blue-wing has been found on Clipperton and Cocos Islands, and on Albemarle and Chatham in the Galapagos group (Gifford, 1913). Its winter status in South America is not wholly clear. Evidently it straggles far south, but it is probably of regular occurrence on the north and northwest coast only and outside the heavy forest regions. The British Museum has specimens from Medellin and Bogotá (Colombia)

Colombia

and A. A. Allen found the species not uncommon near Cali (*fide* F. M. Chapman, 1917). F. M. Chapman (1917) took specimens at Cali and Puerto Valdivia. It is rather common in Ecuador and has been taken at Quito (U.S. Biological Survey), at Colta (Chubb,

Ecuador

1919), at Esmeraldas and at Chone Venavi in October, December and January (American Museum of Natural History), and at La Carolina (Lönnberg and Rendahl, 1922). The British Museum has a specimen from Lima, Peru, and Beck took another at Lake

Chile

Junin in March (Brewster-Sanford collection). The southernmost record is for Ovalle, Chile (Schalow, 1898).

Venezuela Guiana

In Venezuela specimens have been taken at the Lake of Valencia (P. L. Sclater and Salvin, 1869b), near Zulia (Ernst, 1877) and in the same general region by Osgood and Conover (1922). C. B. Dawson (1916) and Chubb (1916) have recorded it from British Guiana and the Penards (1908–10) say it is common in Dutch Guiana in November and December. Von Berlepsch (1908) includes the species in his list of the birds of Cayenne. There is even a record for Brazil (von Pelzeln, 1868–71), but it seems to be open to doubt.

Europe

This species is known to have straggled several times to western Europe. A specimen was taken in Dumfries-shire, Scotland, in January, 1858 or 1863 or both; another in Cheshire, England, 1860; a third at Ballycotton, county Cork, Ireland, September, 1910, and possibly a fourth in Cambridgeshire (British Ornith. Union Checklist). Degland and Gerbe recorded a specimen for Normandy, which was probably the same one recorded by van Schauberg as having been taken on the Straits of Dover in 1857. Another specimen was taken on October 24, 1899, at Dokkum, Province of Friesland, Holland (van Oort, 1922), and there is also a record for Denmark, at Säby, northeastern Jylland, April, 1886 (Winge, 1888).

Migration

Throughout the entire central and northeastern section of the United States this Teal is known primarily as a bird of passage. Such is the case in Colorado, Wyoming, South Dakota, Nebraska, Kansas, Iowa, Missouri, Illinois, Kentucky, Indiana, Ohio, Pennsylvania, New York and the New England States. In eastern Canada and even in Quebec and Ontario, as in Wisconsin and Michigan, it is also seen primarily during the migration season. The species is the least "hardy" of the ducks and leaves late in the spring for its breeding areas, while it is the first to start south in the autumn. It does not appear to leave its winter quarters until the middle of March when its numbers become greatly increased in southern Texas. During early April it reaches its greatest abundance in Louisiana, though it stays in the Gulf regions until well into May. It reaches the central States in April, earlier in the east apparently than in the west. By late April or May it arrives at the breeding grounds in the northern States and in south-central Canada, on the average at least three weeks after the Mallard.

In the autumn the species begins to move throughout the northern States as early as August, and by the first half of September it has become common. I have seen a single specimen in Massachu-

setts as early as August 11. The average date in Virginia is August 31; in Kansas September 12; and in Mississippi September 16. As far south as Bear River, Utah, the great bulk leave before September 25 (U.S. Biological Survey). The last have left Montreal by September 25, and Prince Edward Island, Gulf of St. Lawrence, by October 8. The last are seen in the north-central States by the middle of October, and in the central States by early November. A record for Rutland, Vermont, on November 6, 1917, is very exceptional (U.S. Biological Survey) as well as one from Long Island, New York, on December 11. The autumn flight of these Teal through eastern Massachusetts is a very regular affair and the bulk pass in two or three days between the 5th and the 15th of September, although there are late July records. The first regular migrants arrive the last week in August and the great mass averages about September 8 to 10 for its passage. Nothing like this is seen in spring, only scattered records.

It is noteworthy that not only in the Bermudas but also in the New England and the eastern States in general, the present species is common in autumn though rarely seen in spring. It is more than probable that a certain body of these Teal follow a general northwest to southeast direction in autumn, while in spring their route follows the Mississippi, Missouri and their tributaries, and passes mostly to the west of the Appalachians. This phenomenon was noted by J. E. Cabot as far back as 1847.

The following returns of banded birds are of interest. Out of nine Blue-wings banded at Lake Scugog, Ontario, by Mr. H. S. Osler in September, 1920, there was only one recovery up to March, 1921, that of a bird taken December 9, 1920, at Port of Spain, Trinidad, and reported by the American Consul through the State Department. Four Blue-wings banded at the same point in September, 1921, were taken the following autumn on Long Island, New York, southern Minnesota, northern Kansas, and in South Dakota, suggesting a western origin of some of the Lake Scugog individuals. A large group banded at Avery Island, Louisiana, in winter, besides supplying many local returns, shows some from distant points, namely, Kansas, southern Minnesota, Nebraska and South Dakota, the following autumn. The next few years will of course greatly extend our knowledge of the exact ground covered by individuals.

GENERAL HABITS

The Blue-winged Teal is correctly placed by systematists next to the Garganey and Cinnamon Teals, and close to the Shoveller Ducks. It has even been suggested that it be placed in the same genus with the Shovellers, but this would certainly be going a step too far. Nevertheless, in time of migration, in nesting habits, and even in its manner of feeding, it has many points in common with those curious ducks.

So familiar is this Teal to all American sportsmen that any long account of its life-history would be superfluous. During migration it may be looked for in almost any place where there is water. On our New England coast they do not avoid the salt-marshes, and used to be killed in large numbers in small salt-ponds where the shore-bird gunner commonly placed his decoys. They are also seen on small reedy lakes, the marshes of our sluggish rivers, and, as William Brewster (1906) remarked, they may be found in wet seasons on rain-pools in upland fields, pastures and even apple orchards. On the western prairies they are fond of the smallest sloughs and ditches and seem altogether more partial to small, shallow puddles than to larger open waters. Throughout the elevated portions of New England this has probably always been a rare bird. The same is true of the Appalachian plateau. Yet in far

southern regions it seems to go to considerable altitudes in winter. Carriker (1910) says that it is found in Costa Rica up to 5000 feet, and in Ecuador, in Riobamba, it has been taken at 3100 meters (Chubb, 1919). In Peru, at the extremity of its regular range, Mr. R. M. Beck took a specimen at Lake Junin, 12,900 feet.

Wariness. This is certainly the tamest of American shoal-water ducks, and can be compared to the Ruddy Duck and the Wood or Carolina Duck in this respect. Not only is it a very easy bird to approach, but it is so sociable and gregarious that it comes to either live or wooden decoys without the least suspicion. Flight birds in early September are of course tamer than those on the wintering grounds. A trait which has brought them to the verge of extinction in the Northeast, is their habit of decoying again and again to the dead bodies of their comrades, so that it was no uncommon thing for a whole flock to be wiped out by a single shooter. Small flocks of Blue-wings wintering on the Galapagos were found to be a good deal more wary than the indigenous Galapagos Ducks (Gifford, 1913). It goes without saying that the great congregations of Blue-wings which may be seen on any favorite autumn or wintering ground are far more able to take care of themselves than the little family parties of young birds formerly so common in New England.

Daily Movements. This species is no more nocturnal than other surface-feeding ducks.

Gait, Swimming, Diving. The Blue-wing is a moderately good walker, but does not differ essentially from related species. I have never known them to dive, even in captivity, unless greatly frightened; and even when wounded they are very indifferent divers. In the Louisiana marshes I have frequently seen them perching on tree-trunks and roots in flooded places. They sometimes chose positions several feet above the surface of the water and this habit is much more common than with the Green-wings. Characteristic of this species and common also to the Garganey is their habit of packing closely on the water, and this has been an important factor in accounting for the sadly reduced numbers in certain parts of their range.

Flight. On the wing these birds are very swift and "Teal-like," that is, the flight is with frequent change of direction. The single bird offers one of the best tests for the practiced marksman. Audubon's description brings up such vivid recollections that I do not hesitate to quote him here: "When flying in flocks in clear sunny weather, the blue of their wings glistens like polished steel, so as to give them the most lively appearance; and while they are wheeling over the places in which they intend to alight, their wings being alternately thrown in the shade and exposed to the bright light, the glowing and varied lustre thus produced, at whatever distance they may be, draws your eyes involuntarily toward them."

As in other Teal the actual speed in miles per hour is deceptive. Eaton (1910) credited this species with a speed of two miles per minute, but from what we now know of the velocity of flight of ducks in general it seems likely that fifty to fifty-five miles an hour would be the maximum. Like the Green-wing they gather into very large flocks on their favorite feeding grounds. These great aggregations break up into smaller flocks when flushed. Flocks of from twelve to fifty are perhaps the average during migration.

An excellent sport, and one that will severely test the quickness of the operator, is photographing these Teal over wooden decoys. It is extremely difficult to judge the distance correctly so that the focus will be sharp, and still harder to get the flock in the picture. One bunch of which I secured a good flying picture at about twenty-five yards, contains one hundred and fifteen birds.

Association with other Species. They mix almost indiscriminately with the Green-winged Teal both during migration and in their winter quarters. In our northeastern States single individuals are often seen with Black Duck. Their fondness for the salt-marshes and flats brings them into contact with various species of shore-birds, as noted by Audubon in Florida and by Sanford (Sanford, Bishop and Van Dyke, 1903) near Tampico, Mexico. On their nesting grounds the Blue-wings are neither gregarious nor inclined to associate with other species. Records of mixed clutches are, therefore, rare. Rockwell (1911) tells of one nest found near Barr Lake, Colorado, which was in the side of a muskrat house and contained four eggs of the Teal and five of some big duck, all nine eggs being incubated. Another nest was less than three feet distant from that of a Spotted Sandpiper.

Voice. This Teal is a silent bird, more so, I should say, than the Green-wing. Even when alarmed they do not ordinarily make a noise, so that one may watch them for some time before hearing a characteristic sound. The male's note is a high-pitched sort of squeak, quite different from that of any other Teal, and well described by Wetmore (1920) as a *tseel-tseel-tseel*. I think this note is seldom heard, excepting on the breeding grounds.

The female's call, which is very seldom heard, is an occasional *quack*, high-pitched and coarse, and less Mallardlike than that of the female Green-wing. From large feeding flocks in early autumn one hears a constant chattering, very froglike in character and interspersed with many mouselike squeaks and an occasional *quack*. Even when displaying, captive birds are far more quiet than most ducks.

The tracheal bulb faces to the left and front, is roughly spherical in shape, but more expanded toward the left, smooth and hard, and measures 15 mm. or less in its largest diameter, so that it is a good deal smaller than in the Cinnamon Teal. The trachea is very slightly expanded in the lower third of its

course. It is contracted slightly in the middle and very slightly enlarged at the upper end.

Food. The food of the Blue-wing is not particularly characteristic except that a great deal of animal matter is taken. The investigations made by the United States Biological Survey were based on an examination of three hundred and nineteen stomachs collected mostly in Wisconsin, Florida, Maine and North Dakota during the months of September, October and November, although twenty-five other States and four Canadian Provinces were represented, and specimens were taken in all months but January. The general averages give an adequate picture for the autumn months only. On account of its early departure from the north and its early arrival in the south the animal food forms a larger proportion than in the Green-wing. Perhaps this preference for animal food helps to determine the early departure for the south. The vegetable food was somewhat over 70% and the animal food almost 30%. The former included principally seeds of sedges (18.79%); seeds of pond-weeds comprised 12.6% (one stomach contained 700 seeds of widgeon-grass), though these birds pay much attention to leaves and stems as well as to seeds. Seeds of grasses amounted to 12.26%, the favorite food being wild rice. One stomach contained some corn, and twelve others, taken in Florida in November, had waste grains of rice. Seeds of smart-weeds comprised only 8.22%, while algæ, water-lily seeds, water milfoils and other miscellaneous vegetable food was taken in small amounts.

Of the animal food the most important were mollusks, and among these, snails were most numerous. The stomach of a Teal collected in Iowa in August contained thousands of snail eggs. Insects were found in the proportion of 10.41%, and caddis larvæ together with their cases formed the largest constituent. Beetles amounted to only 2.6% and water-bugs, flies, grasshoppers and ants were found in small numbers. Crustaceans represented less than 2% of the food (Mabbott, 1920).

In the old days, when the cultivation of rice was such an important industry in South Carolina and Georgia, the Blue-wing used to be a much commoner bird than it is to-day. Another favorite food mentioned by nearly all writers, is the wild rice (*Zizania palustris*).

These Teal do not always feed in the manner characteristic of all shoal-water ducks, that is, by "tipping up." In the summer, at any rate, they have been frequently noticed swimming with head immersed up to the eyes (Harper, MS.) and they are also rather fond of sifting for food on mudflats, like other ducks.

All ducks, perhaps, will feed on maggots if they are obtainable. The Blue-wing is no exception. In New Mexico a pair was seen feeding on maggots which had fallen from a dead cow and were floating on the water (Lantz and Piper, U.S. Biological Survey field-notes).

COURTSHIP AND NESTING. Whether or not Blue-wings mate later than other ducks is an open question, but their migration in the spring is so long delayed that their presence in southern localities in May has created the impression that they breed more commonly in the South than is actually the case.

The display, which I have seen many times, is tame and rather uninteresting, entirely different from that of the Mallard, Green-winged Teal or Pintail and more related to that of the Cinnamon Teal or the Shoveller. It consists of an active bobbing of the head up and down and at the same time a little forward and backward. I have often seen the female facing the male and going through the same head performance, although less vigorously. The squeaking note of the male is heard at this time, but is not a very prominent part of the courtship.

The species is a late breeder. The clutches are completed about the same time as with the Shoveller and Red-head, and approximately a month later than with the Mallard and Pintail. Clutches seem to be completed in late May or early June all the way from New Mexico to the northern part of the breeding range. An early nest, with only two eggs, was found by Spreadborough (*fide* J. and J. M. Macoun, 1909) near Edmonton, Alberta, on May 19. The earliest nest found by Rockwell (1911) near Barr Lake, Colorado, contained eleven eggs and was taken on May 24. The average date for complete clutches in this latter region was June 1. In North Dakota the average date was also June 1 (Job, 1902). In western Nebraska nests were found from May 30 to June 22 (Oberholser, 1920; D. Bumstead, U.S. Biological Survey) and in southwestern Saskatchewan sixteen nests were taken by Bent (1907) between June 13 and July 9. In the isolated breeding colony in the Grenadines, at Isle Rhonde, Wells (1887) claims to have taken a nest on January 3! In southern Texas and Louisiana April seems to be the ordinary time.

The nests may be in a variety of situations. Sometimes they are exposed and easy to find, but usually they are well concealed among the vegetation and covered over by grass. Most nests are on dry ground near the water, but some have been found in dense cat-tail growth, and they are not uncommonly placed on the dry prairie, far from the water's edge. In the Barr Lake region of Colorado Rockwell (1911) found nests in reeds, on soggy spongy ground, under irrigation dykes, at the edge of beaten paths near the lake shore, by roadsides back from the water, among dry weeds and sand of the prairie, amidst the dense rank grass on a tiny island, in alfalfa-fields, on grassy flats, and in cavities in and upon muskrat houses. According to W. L. Dawson and Bowles (1909) nests have been found within six or eight feet of a railroad track. In North Dakota as many as twelve pairs have been found breeding in an area of only about eighty acres (U.S. Biological Survey).

The nest itself is like that of other ducks; the amount of care taken in the construction is very variable. The material used is ordinarily grass, but at other times reeds, rushes, leaves and trash are employed.

The clutch is large. Nests found by Oberholser (1920) in Nebraska averaged nearly ten eggs each; those noted by Job (1902) in North Dakota averaged somewhat over nine. The average of a great number of clutches taken by Rockwell (1911) in Colorado was nine to ten. Clutches of twelve are not uncommon and as many as fourteen have been found in one nest (Nelson, 1876). The eggs are pale olive-buff and measure 43.5–49.0 by 32–34.5 mm., the average being 46 by 33 mm. They are not to be distinguished from those of the Green-winged or the Cinnamon Teal, though they are slightly larger on the average, than those of the former.

The incubation period is from twenty-one to twenty-three days (Job, 1915), which is apparently the same as that of the other American Teal. The male shows no more tendency to stay with his mate than do the males of other surface-feeding ducks. Ordinarily they begin to form bachelor parties as soon as incubation has begun. Although change into eclipse plumage undoubtedly begins by late June, I strongly suspect that the process is a rather long affair. Male specimens which were shot in mid-July at Athabasca Lake were only in half eclipse, and my own pinioned specimens are in ragged and intermediate stages until the middle or end of August. Moreover, the most perfect eclipse plumages are seen in old males taken in September and October. This dress is retained, as in the Garganey, through the early part of the winter, but changes very rapidly from early February to March. My own birds have often moulted and grown their wing-feathers before perfect eclipse was assumed but observations on captive specimens are not of course reliable.

There is little recorded that is noteworthy in the behavior of the female during and after incubation.

Status. Before the passage of the Federal law protecting migratory birds this Teal was decreasing everywhere at an alarming rate, and in eastern Canada as well as in the northeastern States it was all but wiped out. There are many good reasons for this state of affairs. The greater part of its breeding range had become in the previous fifty or seventy-five years agriculturalized and settled. In the second place, the tame and unsuspicious nature of the bird, and the absence of any effective law resulted in a heavy mortality during the late summer and early autumn, to say nothing of the spring shooting. Finally the excellence of its flesh caused a great and steady demand for it in the markets.

In our northeastern States until about 1880 this was a common duck, indeed one of the most abundant of the migrant surface-feeding ducks in early autumn, ranking second only to the Black Duck. Talks with any of the better-informed sportsmen of the older generation will convince one of this, and authorities like Brewster (1906), Maynard (*in litt.*) and Forbush (1912) are in accord on this point. My own statistics for Wenham Lake, Massachusetts, are of little value, because the records were started in the autumn too late to include the main flight of Blue-wings, which

begins as early as August and is pretty well over by the 15th or 20th of September. The last great flight in my own region took place in 1904, on the 12th and 13th of September, during which time three hundred and twenty Blue-wings came in to one market-stall in Boston, from the region about Newburyport (C. W. Townsend, 1905). On one of these days I, myself, saw a flock of fifty at Wenham. On September 5, 1919, I visited what used to be one of the great gathering places for these Teal, on the famous marshes at Merrymeeting Bay, near Bath, Maine. Although it was about the right season for Blue-wings I saw only fifty or sixty among many thousands of Black Duck, and professional gunners assured me that it had become a scarce bird. In the Montezuma Marshes of central New York, Griscom writes that there is one Blue-wing now for every thousand twenty-five years ago! The saving feature of the situation lies in the fact that Teal are not now supposed to be shot before the 15th of September, so that the bulk of the migrants through the northern States ought to be immune, and a great many pass through the southern States before the season opens there on November 1. Indeed the small number of returns from banded birds bears out this assertion. We do not know certainly from what breeding ground the Blue-wings which migrate through our northeastern States come. It is doubtful whether the regions about the Gulf of St. Lawrence could ever have supplied the bulk of them, for, in spite of the fact that they once nested in suitable spots all along the lower St. Lawrence, on the Gulf islands and in Nova Scotia, they probably never nested abundantly save here and there. I have gone into some detail on the status of these Teal in the Northeast because their reduction over a large area to not more than five per cent of their original numbers is an excellent example of what over-shooting will do to a species which is not well able to look after itself. The same amount of persecution practiced toward a duck with different habits may have little or no effect.

The records kept by the shooting clubs on Lake Erie are not of much value in estimating the decrease of this bird, for the reason that regular shooting at these points usually began too late to catch the height of the September flight. Furthermore, when other ducks are abundant, sportsmen often stop shooting at Teal. The decrease in Blue-wings in that region, judging by the records of the Long Point and the Monroe Marsh Clubs, and by talks with local sportsmen, is certainly slight as compared with the diminution in New England. Very likely most of the Teal which assemble there migrate chiefly to the Gulf Coast, as the Black Duck and Mallard seem to do, and either do not reach the Atlantic coast at all or only do so at points as far south as South Carolina. At the Monroe Marsh Club between the years 1885 and 1901 the Blue-wings equaled in numbers the Green-wings, and slightly exceeded the Baldpate and Pintail. They represented about nine per cent of all the ducks shot. At Long Point, on October 2, 1916, I noted that these Teal were present in thousands, and were about three times as plentiful as the Green-winged Teal.

Like all western breeding ducks the Blue-wings appear as much more abundant migrants on the Atlantic coast as one passes south of Delaware Bay. They become really numerous on the great brackish marshes of Virginia and North Carolina. The records of shooting clubs, however, are of no particular value, because both species of Teal are usually lumped. Besides this the shooting always began as late as November 1, and recently not until November 10, so that the Blue-wings had almost all passed. The records of the Swan Island Club for the seasons 1909–10 to 1918–19 are interesting only as showing the scarcity of Blue-wings after November 10. Only nineteen were taken in these ten shooting seasons.

Up to the time when the growing of rice ceased in the coastal marshes of South Carolina these Teal were extremely abundant, and no doubt a good many wintered there. Since then, that is since the Civil War, the failure of this crop has greatly changed the character of the feeding grounds, and the region is far less favorable for Teal.

The great winter stronghold of this species in the United States is from the mouths of the Mississippi westward along the coasts of Louisiana and Texas. In the Vermilion Bay region I have seen them wintering literally by the hundreds of thousands in January, although they are said to be exceeded by the Green-wing at this season. On their return in spring, however, the Blue-wing greatly outnumbers the Green-wing (Beyer, Allison and Kopman, 1907).

As far west as the main range of the Rocky Mountains the Blue-wing occurs in enormous numbers, and is by far the commonest species during the month of September, outnumbering even the Pintail on the sloughs and small ponds of the high plains of north-central Montana, where I used often to shoot them. West of the continental divide it is a much rarer bird, but it everywhere overlaps the range of the Cinnamon Teal, both during the breeding season and during migration. In the upper Rio Grande Valley, New Mexico, the Blue-wings in autumn number only 1% to 4% of all ducks (Leopold, 1919). Farther west the species becomes very much rarer, and in California it has never been anything more than a straggler, mixed with flocks of Green-wings.

Although no accurate statistics as to its breeding status in Ohio, Indiana, Michigan and Illinois are available, all writers are agreed that there has been a very marked decrease since the settlement of the country. In Michigan it was classed as the most abundant duck in summer, and formerly a common breeder, though now it nests only to a limited extent (Barrows, 1912). In Wisconsin the situation is very much the same. In 1903, Kumlien and Hollister spoke of a diminution in numbers perhaps greater than in any other species. About 1870, they say, it was an extremely abundant nester in southern Wisconsin, but the numbers breeding there in 1903 were a mere fraction of the former total.

West of the Mississippi, in Missouri and Kansas, the species, like others, has been

coming back rapidly since 1914–15 (Howe, Bull. Amer. Game Prot. Assn., 1919, p. 11) owing to Federal protection, and possibly also to the sanctuaries established on great stretches of the Louisiana coast. In the sandhill region of western Nebraska, Oberholser (1920) during his reconnaissance found it the most abundant duck in the breeding season. In Minnesota, where it is an abundant breeder, it is also very plentiful as a migrant. Estimates made by the Minnesota Fish and Game Commission, 1919–20, showed that the Blue-wing was third in abundance among the ducks shot by the sportsmen of that State. These estimates, admittedly very rough because only a few of the licensed sportsmen take the trouble to report, place the total number of Blue-wings taken in 1919 at 336,000 and in 1920 at 176,000. In North Dakota it has always been, and probably still is the commonest breeding duck (Bent, 1901–02; and others). Northward of central Saskatchewan and Alberta it rapidly becomes a rarer breeding bird until at the delta of the Athabasca, Harper (MS.) found only a few odd pairs and estimated it as fourteenth in abundance among breeding ducks.

Enemies. At Quill Lake, Saskatchewan, Ferry (1910) speaks of Blue-wing's eggs being destroyed by gulls (species?). Rockwell (1911) found a nest in the Barr Lake region of Colorado in which each egg had been perforated and the contents extracted. He does not name the culprit. It is possible that the pack-rat (*Neotoma*) eats duck eggs.

Damage. No doubt these Teal caused some damage in the rice-fields of the southern States before our Civil War, but nothing has been published about damage recently done. The bird is too scarce in the rice districts of California to be of any importance, though it might have some effect on the Arkansas crop.

Food Value. In my opinion this species is equal to the Green-wing as a table bird. Perhaps it is a little better, just because it is somewhat larger. Audubon said that if it should ever be domesticated, "so tender and savoury is its flesh, . . . it would quickly put the merits of the widely celebrated Canvasbacked Duck in the shade." Elliot (1898) and many others have eulogized the tenderness and good flavor of its flesh.

Hunt. These Teal are mostly killed over wooden decoys. They come as readily to a live Mallard decoy as do Mallard or Black Duck, perhaps even more readily for they are extremely tame and sociable. They are also among the most exciting ducks to shoot on a duck pass, for they fly low and fast and flocks are often so packed that one barrel of a 12-gauge gun may bring down a goodly number. One of the pleasantest methods of hunting Teal I often employed in northern Montana in September.

Four of us would ride out on horseback, but only two would carry guns. Arrived at one of the numerous little sloughs varying in size from mere puddles to lakes a mile in length, the shooters would dismount and creep up to one end of the water, where there might be a low pass to a neighboring slough. The other members of the party would take the riderless horses in charge, and circle around to the far end of the same pond, driving out all the ducks, which at that season were mostly Blue-wings, Pintails and Shovellers. Several shots could sometimes be obtained on one such drive and in that well-watered country as many as fifteen or twenty ponds could be driven in a single day.

In New England they were shot mostly by crawling to feeding bunches after these had been marked down, and "shore-bird" gunners probably accounted for most of them.

Alexander Wilson says that where they formerly abounded on the inundated rice-fields of the southern States vast numbers were taken in traps baited with rice and made like a common figure-4 contrivance. He also says that on the Delaware the market-gunners used to kill great numbers at a single discharge by getting out of their floats and pushing them along over the slippery mud until they were within very close range. A good many used to be killed in our own fresh-water marshes by simply poling a boat through the marsh grass and shooting at jumping birds. Audubon was told by a professional New Orleans gunner that the latter had killed one hundred and twenty at a single discharge. Audubon himself saw one of his companions kill eighty-four with two barrels of a shoulder-gun!

Behavior in Captivity. Blue-wings are very often kept in American zoölogical collections and they are favorites with amateurs. They are so easily trapped alive that dealers frequently have large numbers for sale at very reasonable prices. I have often bought them for $5.00 or $6.00 the pair and once or twice for less, though I have also been asked as much as $18.00 the pair for birds said to be hand-reared.

They are not particularly well suited to large enclosures, and really ought to be kept in small pools, well protected from overhead and underground vermin. There is something very mysterious in the way these Teal will gradually disappear from a collection of water-fowl without leaving a single trace, not even a bleached bone or a pile of feathers. I confess I have never been able to account for this. They do have a way of growing secondaries which almost take the place of primaries, and I have seen Teal which I thought safely pinioned, fly quite easily over a four-foot fence after their new feathers had grown out.

The Blue-wings are undoubtedly the most delicate of all our North American ducks, much more so than the Carolina Duck (*Lampronessa*). In our cold northern winters, in spite of good shelter, their feet seem to dry up and become frost-bitten, so that the spring finds many of them lame and in miserable condition for breeding.

I believe if one could winter them in some warm spring where they could always have access to open water, they would prove one of the easiest species to breed. Even under poor conditions they have nested on my ponds and raised large broods of their own accord. One pair hatched as many as ten young. Mr. John A. Cox of East Brewster, Massachusetts, used to rear some. They are apt to become more tame in confinement than the Green-wing.

Blue-wings have always been rare birds in European collections, and, so far as I can ascertain, have never been kept in the London Zoological Gardens. According to Miss Hubbard (1907), the well-known dealer Mr. Jamrach imported from thirty to forty pairs between the years 1900 and 1904 and these were sold for £3 the pair. Both Earl Grey and Mr. Wormald write me that they have kept and bred the species. Portal (1915) had one pair which nested each year but he reared only one of the young. This failure was accounted for by various accidents and the presence of vermin, and I am told that other British wild-fowl enthusiasts have had the same trouble. The single one which Mr. Portal reared behaved little differently from the young of the Common Teal and fared well on ordinary duck-meal, egg, duck-weed, and bread-crumbs. The old males started to go into eclipse in the middle of June. The eclipse was completed as early as July 4, he says, but this is entirely contrary to my own experience. My males begin to "go off" in plumage very early, but the process to full eclipse is a long one and new wing-feathers are sometimes assumed long before the attainment of the full eclipse which is really an autumn plumage in this Teal. Mr. Portal, who has kept many Teal, recommends "paddy" or unhusked rice, with some wheat and barley, as appropriate food. He adds that the birds are very fond of worms, raw machine-minced rabbit, soaked dog-biscuit or Spratt's "crissel"; and fondest of all of water-cress and pond-weeds pulled up by the roots with all the insects on them. The species has occasionally been exhibited on the Continent, and has been kept by the Berlin and Rotterdam Gardens among others.

Hybrids. Crosses between the Blue-wing and other species are very rare and the only wild-killed hybrids yet recorded are those with the Cinnamon Teal and with the Shoveller (Suchetet, 1896; Deane, 1905a).

CINNAMON TEAL

ANAS CYANOPTERA VIEILLOT

(Plate 43)

SYNONYMY

Anas cyanoptera Vieillot, Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 104, 1816.

?Anas jaspidea Vieillot, Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 162, 1816.

Anas rafflesii King, Zoological Journ., vol. 4, p. 97, 1828.

Cyanopterus rafflesii Eyton, Monograph Anatidæ, pp. 38, 132, 1838.

Querquedula caerulata Fraser, Proc. Zool. Soc. London, 1843, p. 118.

Anas caeruleata Lichtenstein, *fide* G. R. Gray, List Birds British Mus., vol. 3, p. 138, 1844.

Pterocyanea caeruleata G. R. Gray, Genera of Birds, vol. 3, p. 617, 1845.

Pterocyanea rafflesii Baird, in Stansbury's Report, p. 322, 1852.

Querquedula cyanoptera Sclater, Proc. Zool. Soc. London, 1855, p. 164.

Pterocyanea cyanoptera Burmeister, Proc. Zool. Soc. London, 1872, p. 368.

VERNACULAR NAMES

English: Cinnamon Teal, Red-breasted Teal, Red Teal, Blue-winged Teal, Raffles' Teal, Little Duck.

German: Zimtente, Blauflügelische Krickente.

French: Canard à ailes bleues, Sarcelle du Chili, Sarcelle brun, Canard à tête jaspée.

Dutch: Kaneelbruine Taling.

Spanish: Pato colorado, Pato frontino, Patito, Patillo, Zarceta coyota.

Mexican: Chilcanauhtli.

DESCRIPTION

ADULT MALE: Top of head blackish. Remainder of head and lower parts rich chestnut color, darker and more blackish on lower abdomen according to the wear on the feathers. Under tail-coverts black. Mantle and upper scapulars black, with irregular chestnut bars. Back, rump, upper tail-coverts and tail brownish black with greenish reflections. Lesser wing-coverts and the outer web of the two outer scapulars pale blue; last row of the greater coverts with a broad white band. Speculum bright metallic green; primaries dark brown. Under wing-coverts brown with a bluish cast, middle coverts and axillars white. Tertials greenish black with a buffy central shaft stripe.

Iris golden yellow to orange or orange red. Legs and feet ochraceous yellow to orange yellow. Bill blackish to black.

Wing 185–225 mm.; bill 42.5–48.5; tarsus 30.7–38.

Weight from about 14 ounces to a trifle over 1 pound (0.39 to 0.5 kilograms).

ADULT FEMALE: Almost exactly similar in plumage to the female of the Blue-winged Teal, but larger, especially in the bill measurement. Weight 12 to 14 ounces (0.34 to 0.39 kilograms).

A very old female from Chile (Museum of Comparative Zoology specimen) has some light-colored barring on the feathers of the mantle, a few large crescentic markings on the lower side, and a suggestion of chestnut color on the breast; in other words it is beginning to assume male plumage.

Iris hazel. Bill black. Legs and feet dull green.

Wing 175–189 mm.; bill 41.4–47; tarsus 30.7–32.

SUMMER PLUMAGE. This Teal has an eclipse plumage through the northern part of its range. I have seen a specimen from Lake Junin, Peru, in Lord Percy's collection which also appeared to be in full eclipse although it looked more ruddy than North American specimens in full summer plumage.

I am not at all sure that this Teal goes into full eclipse over the southern half of its range. Observations in zoological gardens of other species of ducks from the Southern Hemisphere which were known not to have a true eclipse, seemed to show that after a few years in a northern climate some of them started to copy northern ducks by acquiring at least a partial eclipse! Thus it is not impossible that the male Cinnamon Teal may omit the female type of plumage in the Argentine country. Observations of captive specimens in Buenos Aires would be well worth while.

The eclipse of this Teal has seldom been mentioned. California specimens in late July may look almost exactly like the female except for the wings which remain nearly the same as in the winter plumage. Specimens showing this phase are very hard to find, but of course this is the case with nearly every species of common northern duck.

IMMATURE FEMALE: Differs from adult female by having more uniform-looking and paler mantle, lacking the broad light-colored edges to the feathers; lower surface less spotted and more finely streaked in appearance. The whole bird is decidedly lighter in tone than the female in breeding plumage.

IMMATURE MALE (September): Differs from young female only by having a brilliant green speculum in place of a dull speculum. Some light-colored barring on the feathers of the mantle is present in certain specimens, and the tertials and scapulars are dusky and edged with cinnamon brown. Progress toward maturity differs very much in individuals, but by early spring the young male closely resembles the adult except that as Mr. Bent has pointed out to me, the belly still remains more or less dull brown while the colors are everywhere less brilliant.

YOUNG IN DOWN: Appears to be the same as *Anas discors* and very similar to the young of the Mallard. "Top of head dark-olive; sides of head, chin and throat, yellowish buff; stripe from base of bill near nostril to eye and two streaks back of eye, dark brown; upper surface of body dark olive; spot on each side of back and one on each side at base of tail, yellow; whole under surface yellowish buff" (Grinnell, Bryant and Storer, 1918).

DISTRIBUTION

THE Cinnamon Teal has a unique distribution. It is indigenous to both North and South America, while an unoccupied gap is supposed to separate the northern and southern groups. It seems to me, however, that the range must be continuous. In North America it is practically confined to the region west of the Rocky Mountains. It breeds regularly as far north as southern British Columbia (to Lac la Hâche) (Kermode, 1904; Cooke, 1906; A. Brooks, 1917), and in Washington is a common summer resident east of the Cascades (W. L. Dawson and Bowles, 1909). It is an equally common breeder in Oregon (Bendire, 1877; J. C. Merrill, 1888; Woodcock, 1902) and in California (Grinnell, Bryant and Storer, 1918).

British Columbia

Washington

Oregon

Farther south many nest in northern Lower California, in the San Rafael Valley, and at La Grulla, and perhaps even near San Pedro Martir (Brewster, 1902). Inland the species breeds in Arizona, in the Mogollon Mountains (Mearns, 1890) and commonly in the White Mountains (Goldman, U.S. Biological Survey) and to a smaller extent in New Mexico (V. Bailey, 1913), specifically at Lake Burford (Wetmore, 1920). In Nevada it is an abundant breeder (Hanford, 1903; W. P. Taylor, 1912; Oberholser, U.S. Biological Survey), and the same is true of parts of Utah, such as the Bear River Marshes (Wetmore, 1921). Merriam (1873) found this Teal breeding at Marsh Creek, Idaho, and A. A. Saunders (1921) says that in Montana some breed west of the continental divide. It has even been reported breeding near Billings. Wyoming is also within the regular breeding range, and the species is a fairly common summer resident and breeder throughout that State (W. C. Knight, 1902; Grave and Walker, 1913). In Colorado also it is a fairly common summer bird and breeder (W. L. Sclater, 1912).

California
Arizona
Nevada
Utah
Montana
Wyoming
Colorado

Beyond this area the breeding range is somewhat extended by occasional breeding records or summer occurrences. Thus the Cinnamon Teal has been seen in southeastern Alaska in October (Bailey, MS.), and a specimen has been taken in Vancouver (P. L. Sclater, 1859b). Inland specimens are said to have been taken in southwestern Alberta (J. and J. M. Macoun, 1909) and Mr. Harper writes me that in the museum at Edmonton there is a specimen taken near that city, May 12, 1917. Other specimens have been taken or seen in southwestern Saskatchewan, at Hay Creek and Crane Lake in June (Bent, 1907). The easternmost record for Canada is for Oak Point, and perhaps Lake Manitoba, in Manitoba (Taverner, 1919).

Alaska
Alberta
Manitoba

In the United States the Cinnamon Teal breeds rarely in North Dakota near Dawson (Sheldon, U.S. Biological Survey) and almost surely in other parts of Kidder County, where Oberholser (1918a) met with it in the middle of June. In South Dakota it has never been found actually nesting but it is known there as a rare migrant (Reagan, 1908; Holt, U.S. Biological Survey) and in the spring of 1901 was fairly common in Sanborn County (Visher, 1913). In Nebraska, too, it is said to be common at times in the western and central parts (W. E. Taylor and Van Vleet, 1888; Carpenter, U.S. Biological Survey notes). In Kansas several were seen in the western parts in summer, and one, undoubtedly breeding, was taken in Meade County (Goss, 1891). Bunker (1913) states that it is not an uncommon bird in western Kansas, and H. Harris (1919) reports a considerable number taken about Kansas City. Strictly extra-limital records are those for Minnesota (Hatch, 1892), Wisconsin (Kumlien and Hollister, 1903), Iowa (R. M. Anderson, 1907), Missouri (Widmann, 1907), Illinois (Ridgway, 1895), Licking County Reservoir, Ohio (Davie, 1898), Seneca Lake, New York (Eaton, 1910), Town Point, Maryland (U.S. Biological Survey) and South Carolina (Wayne, 1910). Brewster (1907) has disproved most of the records for Florida, but those for Lake Iamonia (Rhoads, 1907), Lake Jackson and Key West (U.S. Biological Survey) seem to have been correct. In Texas the species may occasionally breed. It has been seen in May and June near Laredo, Cotulla and Rock Springs (Oberholser, U.S. Biological Survey), and a few broods have been taken near San Antonio (Quillin and Holleman, 1918). Strecker (1912) says it has bred near Midland. Cooke (1906) says the species has bred near Chihuahua City, Mexico, and the maps of the U.S. Biological Survey show breeding records also for Ocotlan (Jalisco) and Mexico City. I have little doubt that it breeds throughout central Mexico. Sanford (Sanford, Bishop and Van Dyke, 1903) say that at Laguna, in the highlands behind Tampico, it became common by early May, and apparently remained there to breed.

Kansas
Eastern States
Mexico

Winter Range

Not all the Cinnamon Teal migrate far south in North America. A few stay in central and southern California (Grinnell, Bryant and Storer, 1918) and southern Arizona (Swarth, 1914); perhaps also

MAP 63. Distribution of Cinnamon Teal (*Anas cyanoptera*)

Breeding range, dotted lines; winter range of North American birds, broken line
Sporadic records indicated by crosses (×)

in New Mexico (Cooke, 1906). Although not reported wintering in Texas, the species occurs occasionally in Louisiana in autumn or winter (Beyer, Allison and Kopman, 1907). McAtee (1911b) states that in 1911 it was not uncommon, at least twenty specimens having been recorded. It is even reported as increasing there now. **Gulf Coast**

But the great wintering area in the northern hemisphere is not known, for not many seem to stay in northern Mexico. J. A. Allen (1893) has recorded it from Sonora, and there are further records for Mazatlan (Lawrence, 1874), Durango (U.S. Biological Survey), Matamoros, northern Tamaulipas (Phillips, 1911), Guanajuato (Dugés, 1869), Jalisco (Sanchez, 1877-78; Beebe, 1905), Vera Cruz (P. L. Sclater, 1856), Valle de Mexico (Sanchez, 1877-78; U.S. Biological Survey), Guerrero (U.S. Biological Survey), Puebla (Ferrari-Perez, 1886) and Tabasco (Rovirosa, 1887). J. J. Rodriguez (1909–10) includes the species in his list of birds of Guatemala and it has been reported in great flocks on Lake Nicaragua (Rendahl, 1919). There is a specimen from Costa Rica in the San José Museum (Zeledón, 1887), and according to de Armas (1893) it has been taken near Colon. **Mexico**

Its status in the West Indies is that of a rare straggler. L'Herminier (Lawrence, 1879) in an old list gave Guadeloupe and Martinique as localities where it was found, and recently another specimen has been taken at Laguna de Ariguanabo, Cuba (V. J. Rodriguez, 1917). Brewer (1860) had already included the species in a list of the birds of Cuba based on observations of Dr. Gundlach. Recently (December 7, 1922) a single adult male was shot by Dr. H. B. Bigelow at Pea Island, Dare County, North Carolina. This bird, whose skin is now in the Museum of Comparative Zoölogy at Cambridge, Massachusetts, was with a small flock of Blue-winged Teal. **West Indies** **Atlantic Coast**

Migration in North America

On this point I am unable to add much to the notes given by Cooke (1906). Near Laguna, eastern Mexico, Sanford (Sanford, Bishop and Van Dyke, 1903) first noted the species late in March, though it was not common till May. In the United States arrivals have been noted at Ash Meadows, Nevada, March 18; Grangeville, Idaho, April 11; Chilliwack, British Columbia, April 24; Beloit, Colorado, April 23; Colorado Springs, April 9; Loveland, Colorado, April 13; Lay, Colorado, April 20; Omaha, Nebraska, April 10; Lake Como, Wyoming, May 5 (Cooke, 1906); and Bitter-root Valley, Montana, May 12 (A. A. Saunders, 1921).

In autumn the birds leave the United States in late September or early October. As remarked above, it is not clear where the bulk of them spend the winter. The small numbers found in southern California, Arizona and northern Mexico are perhaps birds which nested in British Columbia and Washington. The sporadic breeding birds east of the Rocky Mountains probably go to Louisiana in winter. But where the great mass of birds from California, Utah and Nevada, etc., go, is a puzzle. Wetmore (MS.) banded forty-five on the Bear River Marshes, Utah, in September, 1914, from which he received five returns. Four of these were recovered from the same locality where banded, but one was taken on January 20, 1915, at Mainer Lake, Brazoria County, on the east coast of Texas. Yet comparatively few ordinarily winter in Texas or northern Mexico. The species may be more common in southern Mexico, but it is interesting to note that about all the records for Colombia are for the winter months, so that their journey south may be much farther than is commonly suspected

South America

In South America the Cinnamon Teal is confined to the western and southern parts. Information is too meager to make a distinct division into winter and summer range, or to enable one to determine the migration. In many sections, it is no doubt a resident bird.

In the north the species has been found as far east as Cayenne (von Berlepsch, 1908). Specimens have also been taken in Dutch Guiana (F. P. and A. P. Penard, 1908–10) and others in British Guiana (C. B. Dawson, 1916), but so far as I know it has not yet been recorded from Venezuela. In parts of western Colombia it seems to be not uncommon. P. L. Sclater (1855) has recorded it from Bogotá and Santa Marta, and Hellmayr (1911) from the Rio Sipi. A specimen in the British Museum labeled "New Grenada," is probably from near Bogotá. According to F. M. Chapman (1917) it is an abundant bird in the Cauca Valley, and has been taken at Cali and Palmira also. It occurs occasionally in Ecuador, near Quito (Taczanowski and von Berlepsch, 1885; Goodfellow, 1902). From Peru it has been recorded for Chorillos, Santa Lucia and Tungasuca (Taczanowski, 1886) as well as for Lake Titicaca (J. A. Allen, 1875; Oberholser, 1906). Menegaux (1910) has recorded it from the Bolivian Andes.

Guianas

Colombia

Peru

Farther south this Teal becomes more common. It occurs in Paraguay (H. and R. von Ihering, 1907; Bertoni, 1913) and in southeastern Brazil, in Rio Grande do Sul (H. and R. von Ihering, 1907). In the Argentine it is found throughout, though less commonly in the north. Lillo (1902) has recorded it for Tucuman, Dabbene (1910) for Catamarca, Giacomelli (1907) for Rioja. Frenzel (1891) says it is common in Cordoba, and Schulz (Dabbene, 1910) also found it there. H. Burmeister (1861) found the species along the Paraná, and Hartert and Venturi (1909) have recorded its breeding on the Paraná Islands. Though Burmeister met with the species in Mendoza also, and Mr. J. L. Peters (MS.) recently shot a specimen there in March, Reed (1916) states that it is a very rare bird in that Province.

Paraguay

Argentina

In Uruguay it is an abundant species in winter (Barrows, 1884). Aplin (1894) speaks of it as not uncommon, and Tremoleras (1920) has recorded it for Montevideo and Cerro Largo. In Buenos Aires Province it is most common in winter, though a considerable number stay to breed (A. H. Holland, 1892; Durnford, 1878; P. L. Sclater and Hudson, 1889; C. H. B. Grant, 1911; E. Gibson, 1920). According to Doering (1881) it is common southward to the Rio Colorado. Peters (MS.) found it a not uncommon breeding bird in Rio Negro Province, but Durnford (1878) says it is only a rare resident in Chubut. The range, however, extends to the Straits of Magellan, where the species was found by Cunningham (P. L. Sclater and Salvin, 1868), and again more recently (Salvadori, 1900a). According to Dabbene (1910) it has been found even in Tierra del Fuego. In the Falklands Abbott (1861) found the species not common, but apparently breeding.

In Chile the Cinnamon Teal seems to be moderately common, at least in the central and northern parts. It is said to be plentiful at certain seasons on Chiloë Island (Lane, 1897) and was found very abundant there near Ancud, by R. M. Beck (MS.). There are further records for Valdivia (U.S. Biological Survey), Talcahuano, Colchagua and Santiago (British Museum), Ovalle and La Serene (Schalow, 1898), Antofagasta (Philippi, 1888) and Tarapaca, where it was found breeding (Lane, 1897).

Chile

Migration in South America

Information is too meager to make any definite statement, but it does seem that in southern South America, at least, the birds nest chiefly in Patagonia, retiring to the northern Argentine, Uruguay and southeastern Brazil for the winter. In Chile they probably go south as far as Chiloë Island in some numbers to breed, but in the high Andean regions of Peru they are sedentary as proved by the local race (*Anas cyanoptera orinomus*) which has developed there.

GENERAL HABITS

The Cinnamon Teal is obviously closely related to our Blue-winged Teal but the form of the bill is a little more Shoveller-like and the tracheal bulb is much larger.

Its distribution is exceedingly interesting and by no means entirely understood. There is good reason to think that the bird was originally an inhabitant of the southern hemisphere only, and that it extended its range to North America in comparatively recent times. Coues (1874) brought together all the earliest references to its occurrence in North America, and seems to have been impressed by the fact that the invasion was recent. The view is somewhat strengthened by its very scattered and irregular distribution in summer, and by the apparently recent extension of the breeding range into North Dakota, perhaps even Alberta and Saskatchewan.

Wariness. It resembles the Blue-winged Teal in being one of the tamest of all surface-feeding ducks. These remarks apply to its behavior on the breeding grounds in California (H. C. Bryant, 1914), Oregon (J. C. Merrill, 1888) and Colorado (Preble, U.S. Biological Survey). Observers in South America have not commented on its relative wariness, and neither Mr. Peters (MS.) nor Dr. Wetmore (MS.) noted anything on this point. One of the older writers, Captain Abbott (1861), spoke of it as "very wild" in the Falklands, but this can hardly be a correct estimate.

Daily Movements. Same as with related species.

Gait, Swimming, Diving, Perching. The Cinnamon Teal seemed to Rogeron (1903) more clumsy and thick-set than other Teal, and somewhat lacking in grace and charm. I myself have never had the opportunity to watch them in the field.

Although there are no notes from our own West regarding perching, there is not much doubt that in the forested regions of parts of the South American range, it may do so. E. Gibson (1920) tells what he considers an exceptional incident of a pair which alighted on the brick chimney of one of the buildings in the workmen's quarters of his *estancia* in Argentina. They remained for a quarter of an hour and allowed him to approach within a few yards. This was in the breeding season.

Flight. Large flocks do not occur in our Southwest except when arriving in spring and just before leaving in autumn. Even in these flocks the individuals seem to keep more or less in pairs (Grinnell, Bryant and Storer, 1918). Neither Peters (MS.) nor Wetmore (MS.) in their recent journeys in South America ever saw these Teal in large companies. Wetmore speaks of a flock of thirty males in early December in the Rio Negro region.

Association with other Species. In North America this Teal associates commonly with the Green-winged Teal, and in the breeding season with Blue-wings too

(W. L. Dawson and Bowles, 1909). It is surprising that hybrids between the Cinnamon and Blue-wing are not more common. But male hybrids, if there are any, would ordinarily pass for young-male Cinnamon Teal with adult plumage half developed, and the female hybrids would most certainly never be recognized.

In the high country westward of Tampico, Mexico, Sanford (Sanford, Bishop and Van Dyke, 1903) found them associating with the Green-wing and Blue-wing in early spring, but after these had left for the north, the Cinnamon Teal were ordinarily seen with Gadwall and Shovellers. Of course they must associate at times with many other surface-feeders, and in the San Joaquin Valley, California, they are near neighbors of the Fulvous Tree Ducks.

In the Rio Negro Province of Argentina, Peters (MS.) saw these Teal usually in the company of the other Teal (*Anas versicolor* and *Anas flavirostris*) during and after the breeding season. Wetmore (MS.) saw one flying with a flock of Chiloë Widgeon near General Roca on the Rio Negro.

So far as I know their eggs are hardly ever mingled with those of other ducks but there is a record of one nest found near Brigham City, Utah, and identified by Messrs. Treganza and O. M. Lindsay, which contained two Cinnamon Teal eggs, three Red-head eggs and two eggs of the Canvas-back (U.S. Biological Survey records)!

Voice. The only description of the male's voice is that given by Wetmore (1920) in his account of the breeding birds at Lake Burford, New Mexico. He says it is a "low, rattling, chattering note" audible only for a short distance. The female has a weak quacking note, but both sexes are uncommonly silent.

The tracheal bulb, apparently hitherto undescribed, is in shape a rough ellipsoid, measuring 16 to 20 mm. in its longest diameter, and 13 mm. in the minor axis. It faces forward and to the left and surrounds the left bronchus. It is interesting to notice that this structure is two or three times as large as it is in the Blue-winged Teal (*Anas discors*) besides being rather differently shaped.

Food. The only exact analysis of the food-habits is that made by the U.S. Biological Survey (Mabbott, 1920). Even this comprised the study of only forty-one stomachs, taken between March and October, mostly in Utah and California, with some from other western States. The vegetable food was in slightly larger proportion than in the Blue-wing, and comprised nearly 80% of the whole. As in the two other North American Teal the principal items of food are the seeds and other parts of sedges and pond-weeds. The sedges amounted to 34.27% and the pond-weeds to 27.12% of all the food. Plants well represented were the seeds of prairie bulrush (*Scirpus paludosus*), seeds of the true pond-weeds (*Potamogeton*) and the widgeon-grass (*Ruppia maritima*). One bird had eaten four hundred large seeds of a pond-weed, and another nine hundred and fifty seeds of widgeon-grass. The grass

family represented 7.7%, the smart-weeds 3.2% and other families of plants in much smaller amounts.

The animal food comprised a little over 20% of the total, and included insects and their larvæ, 10.19% (beetles, water-bugs and water-boatmen, dragon-flies and flies of various species), mollusks, mostly snails, 8.69% and miscellaneous animals, 1.26%.

In a stomach which Mr. J. L. Peters brought back from the Argentine, Mr. McAtee found many seeds of *Rumex* (dock), more than 360 seeds of *Myriophyllum* (water milfoil), about 80 seeds of *Scirpus americanus* (rush), a few other small seeds and remains of caddis larvæ and cases, besides bits of a snail.

Courtship and Nesting. The display is said to resemble exactly that of the Shoveller (Wormald, 1914) which means that it is also very similar to that of the Blue-winged Teal. The mating flight does occur, but is not so high nor so graceful as in other Teal, Dr. Wetmore tells me. On the breeding grounds the males are pugnacious, and this seems to be a marked characteristic of the species. Hudson (P. L. Sclater and Hudson, 1889) considered them the most pugnacious of all the Teal in the Argentine, and says that when two pairs meet, the males almost invariably fight. More recently this behavior has been described by W. L. Dawson and Bowles (1909) and by H. C. Bryant (1914). The latter says that the "combatants, swimming on the water, would face each other about a foot apart, and make lunges at each other, using both bill and wings as weapons. Occasionally one of the birds would avoid attack by diving, allowing the other to jump completely over him." At Lake Burford, New Mexico, Wetmore (1920) also noticed great competition among the males, while single males insisted on paying attention to females already mated. On one occasion six males were seen making a demonstration toward one female, who paid no attention to them but followed her mate. He swam first at one then at another of the interlopers, and after each chase returned to his mate, bowing rapidly, while occasionally she bowed to him in return. After a few minutes another pair of mated Teal flew by and four of the bachelor males flew off after the new arrivals.

In North America the Cinnamon Teal seems to nest a bit earlier than the Blue-wing, which is natural in view of its more western distribution. In Washington the breeding season extends from May 20 to June 15 (W. L. Dawson and Bowles, 1909) and in Oregon nests are found from May 15 to at least the middle of June (Bendire, 1877; J. C. Merrill, 1888). Nests have been found in California as early as April 18, and as late as July 14. The average time for full clutches is perhaps the first half of May (Grinnell, Bryant and Storer, 1918) but there are so many dates for late May and early June (U.S. Biological Survey) that I do not feel certain of this. In Colorado, where the breeding areas of the two species distinctly overlap, the Cinnamon Teal is said to nest a little later than the Blue-wing (Preble, U.S. Biological Survey).

We have no definite knowledge of the breeding season in the Andean parts of South America. Presumably it is very irregular as with other ducks. At Sacaya, in northern Chile, they breed in January (Lane, 1897) and at San Carlos, central Chile, eggs were taken from the ovary of a female early in April (Lataste, 1895). In the Argentine and Patagonia the nesting begins about mid-October, later than with some other species. Most clutches are deposited in November, and some even in the first part of December (Peters, MS.; Wetmore, MS.; E. Gibson, 1920; Hartert and Venturi, 1909).

Owing to its fondness for the tule swamps of our Southwest, some nests are placed among tules, sometimes above shallow water, but more often above damp ground. The nest is, however, usually on drier ground and may be placed in grassy fields or alfalfa patches, and in other situations some little distance from the water. It is made of grasses or rushes (*Tule*) compactly woven together and deeply saucer-shaped.

In South America, the nests are sometimes in grassy hummocks in marshes (Peters, MS.), on islands amid swamps, or among thistles at the edge of swamps (E. Gibson, 1920).

The clutch varies from six to thirteen eggs, but clutches of less than seven are very exceptional. The average is the same as in the Blue-wing, that is, between nine and ten. The eggs are creamy white or pale buff, indistinguishable from those of the Blue-wing, but slightly larger than those of the Green-wing. They measure 44–53 by 30–35 mm., averaging 47.5 by 34.5 (Grinnell, Bryant and Storer, 1918). The nest-down is very dark and similar to that of the Blue-wing.

The incubation period is supposed to be twenty-five or twenty-six days (Heinroth, 1908; H. Wormald, *in litt.*) and if so it is several days longer than in other Teal, which is a point of some interest in comparing relationships. The behavior of the males during and after this period is of peculiar interest in this species, because the published observations are so contradictory. At least we can say that at times the male does remain about the nest throughout the incubation period and is seen with the brood. The evidence for this statement is as follows: Mr. A. M. Shields (F. A. Schneider, 1893) is quoted as saying that after hatching her eggs, the female is joined by the male who assists in the defense of the family; furthermore H. C. Bryant (1914) says he found a brood on the lower Klamath Lake which was accompanied by both parents; finally F. M. Chapman (1908) speaking of the San Joaquin Valley, says that he paid especial attention to this point and found that the drake was always within a few feet of the duck when she was off the nest (during incubation) and that he invariably sprang into the air a foot or two behind her when she took wing. On the other hand Wetmore (1921) who had unique opportunity to observe hundreds of Cinnamon Teal breeding at Bear River, Utah, says nothing of the male accompanying the brood. During his stay at Lake Burford, New Mexico,

he found direct evidence that immediately after the nesting season the males flock together as with other North American shoal-water ducks. Moreover, during his South American trip in 1920, the field-notes of which he has kindly sent to me, he found distinct evidence to corroborate what he had seen in Utah and New Mexico. As early as December 3 he saw a flock of thirty adult males near General Roca, Rio Negro. In Rio Negro Province Peters (MS.) never saw a male near the nest.

I have a letter from Dr. Wetmore upon this same subject. After a general statement to the effect that this Teal acts in the same way as do other surface-feeders during the breeding season, he adds: "I have seen males with females and recently hatched young *once or twice*, but have not been convinced that the two were of necessity a lawfully wedded pair, for males whose females have left them often try to interfere with other pairs."

STATUS. In the United States the Cinnamon Teal is known almost exclusively as a breeding bird, so that its status as we know it refers principally to the summer season. Near Chilliwack, British Columbia, A. Brooks (1917) considered it next to the Mallard in abundance up to the '80's. Since that time it has become scarce, owing to the floods on the Fraser River and the shooting of broods before they could fly. In Bendire's (1877) time it was considered the commonest Teal in southeastern Oregon, and in the Malheur Lake as many as one thousand pairs were noted in April and May, 1915 (Cantwell, U.S. Biological Survey notes). Its status in California is summed up by Grinnell, Bryant and Storer (1918) who consider it, as regards the whole State, the commonest breeding duck, though the Pintail and Mallard may outnumber it in certain localities. In the San Joaquin Valley it is particularly numerous. Oberholser and Bailey (U.S. Biological Survey) spoke of it as the most abundant summer duck in the Ruby Valley and other parts of Nevada, while on the Bear River Marshes, Utah, it was extremely numerous as a breeding bird. Only the Red-head exceeded it, and the population was estimated by Wetmore (1921) at 800 pairs. At Barr Lake, Colorado, only about half as many Cinnamons as Blue-wings were breeding (Rockwell, 1911). Near Lake Burford, New Mexico, it is also a very common breeder (Wetmore, 1920). In the White Mountains of Arizona, near Marsh Lake, about sixty pairs were found breeding (Goldman, U.S. Biological Survey), and Commissioner Arthur of Louisiana thought it more common than it used to be on the Gulf coast of that State (Bull. Louisiana Dept. of Conservation, no. 5, 1918). Its status through the rest of the United States is not well known. It has often been confused with the Blue-winged Teal, and though rather widely distributed it can only be regarded as a summer straggler from farther west and south.

Of course these Teal have come into very close association with man and his works all over our Southwest. Although irrigation has in many places increased the water

surface and the food possibilities, it has also increased the risks of nesting birds, so that accidents from flooding of the nest site or its destruction by mowing machines are rather too common.

Its status in South America is by no means clear. It seems to be nowhere a really abundant duck. It is certainly not found in great numbers on the Andean plateau, where it is sedentary, and has developed into a larger race (*Anas cyanoptera orinomus*). In Rio Negro Province of Argentina, Peters (MS.) estimated them at 1% to 2% of the total number of the eleven species of ducks found there. It was about as common as the Red Shoveller and the Yellow-billed Teal. Neither P. L. Sclater and Hudson (1889) nor E. Gibson (1920) speak of its occurrence in any considerable numbers in the Argentine.

Enemies. Nesting Cinnamon Teal seem to be particularly exposed to the attack of predaceous animals, but this destruction has not been traced to any particular species of mammal or bird. In Washington, W. L. Dawson and Bowles (1909) found that only four out of twenty-eight nests which they observed remained unmolested during their two weeks' visit, and they tell of finding a female which had been killed on or near the nest. H. C. Bryant (1914) states that out of twenty-three nests found near Los Baños, California, eighteen were destroyed by some predaceous animal. The probable culprits are racoons, weasels and perhaps coyotes. Although the clutches are large, broods of more than four or five are rarely seen (Tyler, 1916) and probably not more than three or four birds are, on the average, reared to maturity.

Damage. None mentioned.

Food Value. In California the flesh of this species is rated as inferior to that of other Teal. Its "keeping" qualities are said to be poor (Grinnell, Bryant and Storer, 1918). This is partly because it takes much animal matter, and also because it is, or rather was before the law prevented, shot in warm September weather.

Behavior in Captivity. It is a curious fact that this bird, though not abundant, is much better known in European bird collections than in our own. Here it has always been scarce and high-priced. The London Gardens received five specimens between the years 1884–93. These lived on the average 13½ months, the maximum being three years, seven months (P. C. Mitchell, 1911). Two more pairs, probably hand-reared, were received from Holland in 1910 (Seth-Smith, 1911) but, so far as I know, the species has never bred in the London Gardens. Several broods are said to have been reared in the Kew Gardens (Seth-Smith, London Field, vol. 129, p. 920, 1917) and Mr. St. Quintin (London Field, vol. 133, p. 12, 1919) had young

birds reared by the parents, but these escaped. Mr. Wormald writes me that he, too, has reared them. On the Continent the species has evidently been bred in Berlin, and Rogeron (1903) says two of his friends in or near Angers, France, had little trouble in breeding them for several years. The adults and the young were treated the same as the Carolina Ducks and Mandarins.

Dealers in live birds have often confused the nomenclature of this species with that of the Blue-winged Teal (*Anas discors*) so that we do not always know what European fanciers are talking about when they write of "Blue-winged Teal." They usually mean the present species, sometimes perhaps the common Garganey.

Cinnamon Teal reared in captivity are known to breed (at least some of them) the first year. Mr. Wormald's stock in Norfolk, England, have laid as early as April 20 and these were no doubt originally obtained in South America. Hand-reared birds fetch a high price, about £6 per pair, and are by no means easy to get.

HYBRIDS. The only wild-killed hybrid hitherto reported is between this species and the Blue-winged Teal (Suchetet, 1896; Deane, 1905a). One between the Cinnamon Teal and the Carolina Duck has been bred in captivity (Poll, 1921).

GEOGRAPHICAL RACES

ANAS CYANOPTERA CYANOPTERA VIEILLOT

CHARACTERS: Size smaller. Wing of males 180–202 mm.; bill 42.4–47.7; tarsus 30.7–33.5.

RANGE: Entire range of the species excepting the Andean plateau of Peru.

ANAS CYANOPTERA ORINOMUS (OBERHOLSER)

Querquedula orinomus Oberholser, Proc. Biol. Soc. Washington, vol. 19, p. 93, 1906.

CHARACTERS: Size larger. Wing of males 219–225 mm.; bill 46.0–48.5; tarsus 36.5–37 (Museum of Comparative Zoölogy specimens from Lake Titicaca). The color characters enumerated by Oberholser do not appear to be reliable in the small series at hand. The black chin is a variable character and probably increases with age, as in the Garganey and Blue-wing.

RANGE: Andean plateau of Peru.

ARGENTINE GRAY TEAL

ANAS VERSICOLOR VIEILLOT

(Plate 44)

SYNONYMY

Anas versicolor Vieillot, Nouveau Dictionnaire d'Hist. Nat., vol. 5, p. 109, 1816.

Anas maculirostris Lichtenstein, Verzeichniss d. Doubletten, p. 84, 1823.

Anas fretensis King, Proc. Zool. Soc. London, 1830, p. 15.

Cyanopterus fretensis Eyton, Monograph Anatidæ, p. 131, 1838.

Anas muralis Merrem, in Ersch and Grube's Encyclop., sect. 1, vol. 35, p. 42, 1841.

Cyanopterus maculirostris Hartlaub, Verzeichniss nat.-hist. Sammlung. Ges. Mus., p. 119, 1844.

Querquedula maculirostris G. R. Gray, List Birds British Mus., pt. 3, p. 138, 1844.

Pterocyanea maculirostris G. R. Gray, Genera Birds, pt. 3, p. 617, 1845.

Pterocyanea versicolor Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, p. 650, 1856.

Querquedula versicolor Cassin, U.S. Astron. Exped., vol. 2, p. 203, 1856.

Pterocyanea fretensis Eyton, Synopsis Anatidæ, p. 85, 1869.

VERNACULAR NAMES

English: Argentine Gray Teal, Gray Teal, Brilliant Teal, Pampas Duck.

Spanish: Pato silvestre, Pato de cienaga, Pato capuchino, Patite marrueco, Marrequinho de campo, Pato argentine.

DESCRIPTION

ADULT MALE: Upper half of the head very dark brown to black, sharply defined from the buff of the face and sides of neck. Chin, throat and neck buff, finely speckled with black; mantle and upper scapulars black, the feathers tipped and barred with light gray and buff. Lower scapulars olive brown. Back, rump, upper tail-coverts and tail black, finely barred with wavy white lines. Breast and upper abdomen buffy, with many round black spots and bars. Lower abdomen and under tail-coverts white, closely barred with regular black lines, the bars narrower posteriorly. Flank feathers conspicuously banded with black and white. Outer wing-coverts dull slaty blue except the last row which have a broad white band anterior to the speculum. Speculum glossy green to purple, bordered behind with a black and then with a white bar. Primaries brown with an olive tint. Tertials same color as primaries but with a central white strip. Under wing-coverts dark brown or white; axillars pure white.

Iris hazel to dark red. General color of bill blue, but on the top of the culmen and on the nail black; on each side below the nostril a large spot which is bright yellow. Legs and feet olive gray to bluish gray or plumbeous; webs dusky.

Wing 190–210 mm.; bill 46; tarsus 36.

ARGENTINE GRAY TEAL

PUNA TEAL

ADULT FEMALE: Similar to the male, but the speculum with less strong green reflections. Wing 180–200 mm.; bill 42–44; tarsus 34–36.

IMMATURE SPECIMENS are less plainly marked on the mantle and lack the long ornamental tertials. The lower parts mostly lack the definite round black spots, and the ornamental feathers of the lower flanks are not so well developed. The speculum is a little duller and the top of the head more brownish.

YOUNG IN DOWN: Entirely unlike young of Mallard and of American Blue-winged Teal and more nearly like that of the Brown Pintail. Upper side, particularly crown of head, back and rump, jet black. Lower surface grayish white, grayer on flanks and upper breast. Sides of head marked with very distinct pattern, consisting of a broad eye-streak running back and merging with the black head-cap. Between this and the head-cap a narrower grayish streak. There is an irregular dark aural patch and sometimes an indefinite darker streak running back from angle of jaw. The bill is heavy and deep resembling that of the Pintail early in life.

DISTRIBUTION

THIS species is resident in the southern parts of South America, but it is evidently more or less migratory at the extremities of its range. The northernmost record is for the Bolivian Chaco, where the species was found near Tarija (Lönnberg, 1903). It is a common bird on the lower Pilcomayo, near Fortin Donovan (Kerr, 1890) and is included in the lists of Paraguayan birds compiled by H. von Ihering (1904) and Bertoni (1914). It has also been taken in the extreme southeastern part of Brazil, Province of Rio Grande do Sul (Hartert, 1891; H. and R. von Ihering, 1907). In Uruguay it is a common bird, most abundant in winter. It has been recorded from Concepcion, San José, Montevideo, Canelones, Maldonado, Rocha and Cerro Largo (Barrows, 1884; Aplin, 1894; Tremoleras, 1920).

This Teal occurs everywhere in the Argentine and has been recorded from Jujuy (Lönnberg, 1903), Tucuman (Lillo, 1902), Santiago del Estero (Hartert and Venturi, 1909), Rioja (Giacomelli, 1907), Cordoba (Schulz, *fide* Dabbene, 1910) and Mendoza, where it is said to be common in the Lavalle Department (H Burmeister, 1861; Reed, 1916). In the Province of Buenos Aires it seems to be fairly common, though few birds appear to nest (A. H. Holland, 1892; Hartert and Venturi, 1909; C. H. B. Grant, 1911; E. Gibson, 1920). In Patagonia, however, it is everywhere a fairly common resident. Mr. J. L. Peters (MS.) found it so in northwestern Patagonia (Rio Negro) and Durnford (1878) in central Patagonia. Doering (1881) has recorded it from the Rio Negro, and the Museum of the University of California has specimens from the same region. The Princeton Expedition met with it near the east coast (Scott and Sharpe, 1912).

In Chile it is evidently not a common bird. James (1892) describes it as an occasional visitor. The British Museum has specimens from Santiago and the Rio Bueno, and Lane (1897) also met with the species at the latter place. Schalow (1898) has listed a specimen from Concepcion and the U.S. National Museum has one from Peine.

Cunningham met with it at Punta Arenas in the Straits (P. L. Sclater and Salvin, 1870a), but in Tierra del Fuego it seems to be almost entirely migratory (Crawshay, 1907; Vinciguerra, *fide* Dabbene, 1910; Blaauw, 1916a). R. M. Beck, however, took a specimen there in mid-winter, July 3 (Brewster-Sanford collection). It is not a common bird in the Falklands, but it evidently breeds there (Abbott, 1861).

Sundevall (1871) has described a specimen taken on the Galapagos Islands. No further information as to its occurrence in that group is available.

GENERAL HABITS

This Teal, which is usually placed with the true Blue-winged Teals (under the name *Querquedula*) has, except for the bluish outer wing-coverts, really very little in common with them. The downy young are so entirely un-Mallardlike and differ so widely from the young of the Blue-winged, Cinnamon and Garganey Teals that any close relationship seems unlikely.

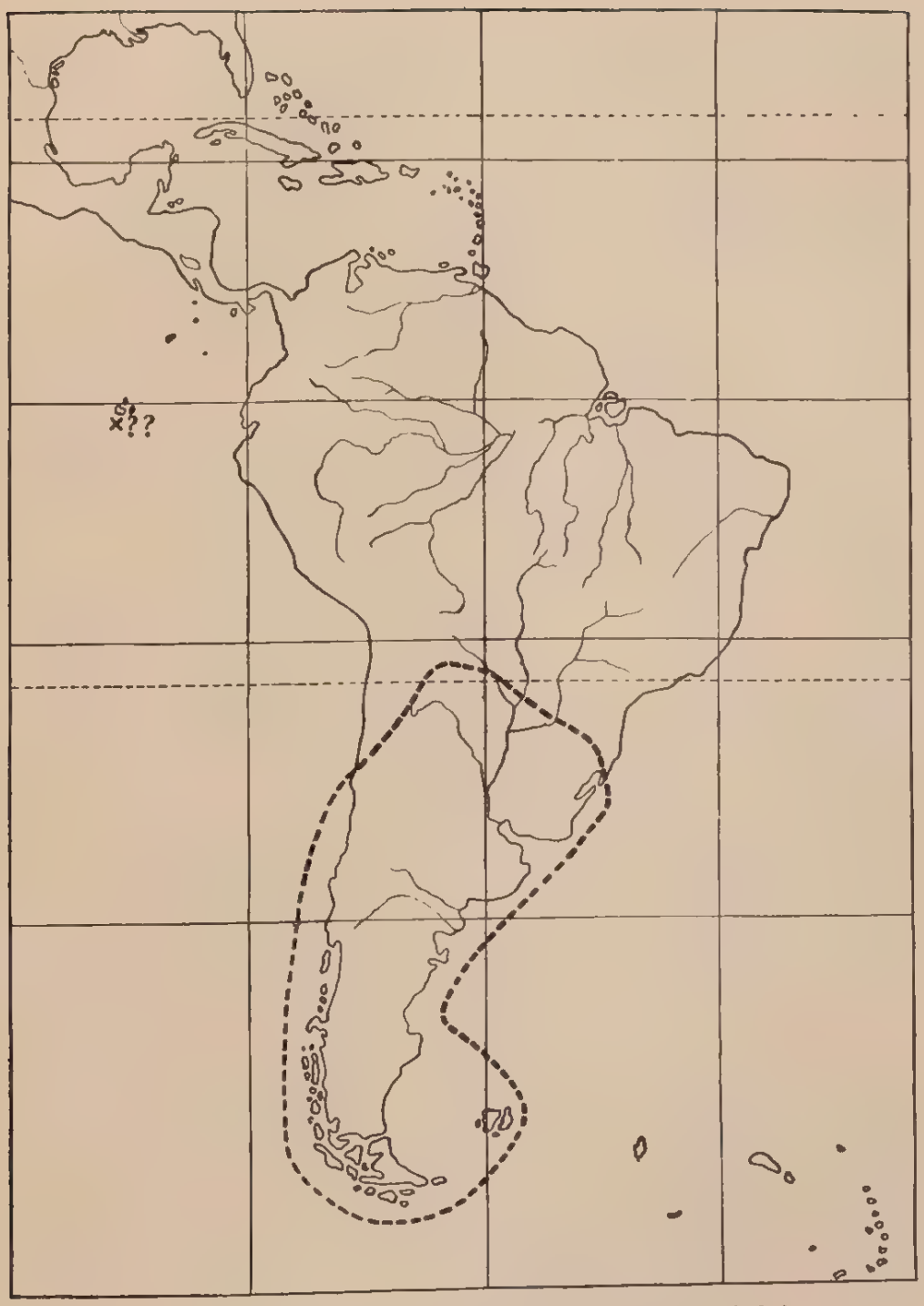
The Gray Teal is perhaps more of a seasonal visitor at the northern and southern extremities of its range than are other South American ducks. In Uruguay it is almost entirely migratory (Barrows, 1884; Aplin, 1894) and in Tierra del Fuego it must be very rare in winter, although Beck (Brewster-Sanford collection) took a specimen on March 18 (late autumn) and another on July 3 (mid-winter). A single specimen was seen with a flock of migrating Brown Pintails flying north on March 28 near Tunuyan, Mendoza, presumably to its winter quarters (Peters, MS.).

There is nothing worthy of note concerning the type of country inhabited by this Teal. It is a strictly fresh-water bird, frequenting shallow open pools in the marshes and reed-beds, particularly in the breeding season. It is a quiet retiring little duck and even when flying it stays close to the ground or water. It is easily distinguished from the other Teal of the Argentine by the black cap, cream-colored cheeks and barred flanks, while the blue on the angle of the wings forms a good field-mark.

Wariness. This is one of the tamer, if not the tamest of the ducks in the Argentine and in Uruguay (Barrows, 1884). In northwestern Patagonia, where they are little disturbed, Mr. J. L. Peters (MS.) found them fairly tame, permitting approach to within easy gunshot in the open, provided of course that the collector advance slowly and quietly. When put up from a favorite reed-bed they would circle about, generally within range. Other naturalists (Crawshay, 1907) have also noticed their habit of circling about low, quite unlike the Chiloë Widgeon or Brown Pintail. They seem to be sluggish and loath to go far from their chosen haunts.

Swimming, Diving. These birds appear to be entirely surface-feeders, that is, they do not even "tip up" as so many other shoal-water ducks do (Peters, MS.).

Flight. When flushed they fly with swift darting flight and always low, as already remarked (Wetmore, MS.). Ordinarily they do not seem to gather in large flocks, but pairs or groups of five or six are most commonly seen (A. H. Holland, 1892; Crawshay, 1907). Rarely they form large aggregations like those of Brown Pintail, Chiloë Widgeon or Crested Duck. P. L. Sclater and Hudson (1889) speak of them as occurring in larger flocks than any other Argentine duck. But unless its status has greatly changed in recent years this statement can hardly be correct, as



MAP 64. Distribution of Argentine Gray Teal (*Anas versicolor*)
Questionable sporadic record indicated by cross (×?)

the Brown Pintail has always outnumbered all other species. Besides being a swift flier, these birds are erratic on the wing. The flocks are very compact and the turns are made, as in other Teal, without breaking the formation (Peters, MS.).

Associaton with other Species. Although they are not particularly sociable, they were found mingling with Yellow-billed and Cinnamon Teal in northwestern Patagonia. More rarely Brown Pintail and Chiloë Widgeon were mixed with them (Peters, MS.). In Uruguay they were once seen in the company of Shovellers (Aplin, 1894), but Durnford (1878) speaking of Buenos Aires Province, says the flocks never mix with those of other species.

Voice. The voice of the male is very peculiar and does not resemble the whistled calls of many of the smaller ducks, Pintail and Widgeon. Hudson (P. L. Sclater and Hudson, 1889) long ago described it as resembling in sound the "muffled stridulating of the mole-cricket." Those who have never heard the mole-cricket will perhaps get a better idea of the note from Mr. Peters's (MS.) comparison. He likens it to the "quick winding of a cheap watch" and the note which he heard in flight is slightly ventriloquial and audible for a short distance.

The female's voice is entirely different and consists of a low sound perhaps halfway between a quack and a croak (Peters, MS.). When they are frightened, Heinroth (1911) says they utter a rather loud *quack*, when restless a much softer *quack*.

The trachea of the male is very peculiar and interesting. The upper middle part is expanded and flattened for a distance of 55 mm., forming a chamber 14 mm. in breadth and about 10 mm. across. The tracheal bulb is large, irregular, facing to the left and back, and measures 20 to 23 mm. in its longest diameter by 15 mm. in its shortest. It is very robust and solid for so small a duck. The female's trachea is, of course, simple, but in newly hatched young males the tracheal bulb is easily recognizable and is about 4 mm. in diameter. The female at the same age also has a bulb, which appears somewhat smaller, less rigid and in process of retrogression.

Food. Mr. Peters collected seven stomachs from Huanuluan, Rio Negro Province of Argentina, in August and September, 1920. Mr. W. L. McAtee kindly examined these and reports vegetable matter in the proportion of 40 to 98% with an average of 81%. The principal vegetable foods were the same as in other ducks from that region, consisting of the seeds of *Myriophyllum* (water milfoil), *Carex* (sedge), *Scirpus americanus* (rush) and other sedges, *Rumex* (dock) and a few of *Zannichellia palustris* (horned pond-weed) and *Batrachium* (water crowfoot). Besides this there were shreds of grass and other vegetable débris.

The animal food, which is in somewhat greater proportion than in other ducks, consists of amphipods, caddis larvæ and their cases, hydrophilid larvæ (water-

scavenger beetles), Corixidæ (water-boatmen) and one *Chironomus* larva (midge). There were also remains of a *Tropisternus* (water-scavenger beetle).

Courtship and Nesting. Not much has been written about the nesting habits of this species. It arrives at its southern breeding grounds in Tierra del Fuego (Crawshay, 1907) and probably breeds later than the Brown Pintail, Crested Duck or Chiloë Widgeon. In northwestern Patagonia it seemed to Mr. Peters (MS.) to be completely mated by September first. Once or twice about that time he saw male birds swimming about another, presumably a female, with neck extended and bill almost touching the water. A female killed on September 13 had not yet completed her moult and had about 90% of the contour feathers with soft bases and unabsorbed pigment, while the ovaries were only about as large as peas. Nearly a month later, on October 16, a male in full breeding plumage and with sex organs fully developed, was collected. Young in down were taken between November 13 and 16. Fully grown young were noted on January 8 and 11. The only nest found by E. Gibson (1920) in Buenos Aires Province was taken on October 10. Venturi took two eggs as late as January 7 at Santiago del Estero in the northern Argentine (Hartert and Venturi, 1909). All over the northern part of its range the season is undoubtedly very extended and irregular.

The nest is made in the reeds, and evidently is well lined with down (E. Gibson, 1920; Peters, MS.). Only one or two nests have ever been described, but there is no doubt in my mind that A. H. Holland (1892) is wrong in stating that they nest in the Green Parakeet colonies. That naturalist evidently confused the present species with the Yellow-billed Teal (*Anas flavirostris*) which, so far as I know, is the only duck in the Argentine that resorts to those unusual sites.

The clutch, according to the popular account of Alvarez (1913) numbers eight to ten. The only nest ever found by E. Gibson (1920) contained nine eggs. I have been unable to find any description of the eggs nor is anything known of the length of the incubation period. Mr. Peters (MS.) found the male as well as the female in the vicinity of the nesting sites, which they were very loath to leave. It seems to me not improbable that in this species, where the sexes are so similar, the male remains with the female, perhaps until the young are hatched. The only contradictory evidence is a note by Wetmore (MS.) concerning Buenos Aires Province, where, on November 9, he encountered several flocks containing from eight to ten males which had apparently banded together after having bred. There is, of course, no actual proof that they were not non-breeding birds of both sexes, for it is very difficult to distinguish males and females.

Status. In northwestern Patagonia this species was third in order of abundance during the breeding season and represented about two to three per cent of all the

ducks (Peters, MS.); it was exceeded by the Chiloë Widgeon and greatly outnumbered by the Brown Pintail, which was twenty to thirty times as numerous. Barrows (1884) considered it the commonest duck in winter in Uruguay. In Chile it is somewhat more rare than the Cinnamon Teal (Philippi, 1868).

Behavior in Captivity. According to Miss Hubbard (1907) these Teal were not exhibited by the London Gardens until 1902, when a pair was purchased from the Zoological Society of Antwerp. Mr. Jamrach, the well-known importer, informed her that it was plentiful at times in the bird markets and was sold by him at £6 the pair. It has been kept in Berlin, but apparently has not bred there. In fact, I am not sure that it has ever been bred in Europe. It has been exhibited in the New York Gardens and Job (1915) states that Mr. Cook of Woodbury, Long Island, has bred the "Pampas Teal." This may or may not refer to the Argentine Gray Teal. The price in New York was about $9.00 each.

Hybrids. There are no wild hybrids on record, but Mr. Wormald (1914) states that in confinement he has crossed this species with the Baikal Teal (*Anas formosa*).

PUNA TEAL

ANAS PUNA TSCHUDI

(Plate 44)

SYNONYMY

Anas puna Tschudi (*ex* Lichtenstein, MS.), Archiv f. Naturgeschichte,vol. 1, p. 315, 1844.

Querquedula puna G. R. Gray, Genera of Birds, p. 616, 1845.

Punanetta leucogenys Bonaparte ("Tschudi," *errore*), Compt. Rend. Acad. Sci. Paris, vol. 43, p. 649, 1856.

Punanetta puna G. R. Gray, Hand-list Birds, vol. 3, p. 84, 1871.

Adelonetta puna Heine, Nomenclator Mus. Heineanum Ornith., p. 346, 1890.

VERNACULAR NAMES

English: Peruvian Teal, Puna Teal. *Spanish:* Pato capuchino, Cherito.

DESCRIPTION

ADULT MALE: Similar to the male of *Anas versicolor*, but much larger. The upper half of the head is deep black, more iridescent and the cheeks and throat are very immaculate buff-color. The bars on the flanks, lower abdomen and under tail-coverts are narrower. The lower back and rump are uniform dusky olive, and not barred with black and white as in *Anas versicolor*.

Iris dark hazel (P. L. Sclater and Salvin, 1876) but black according to Lane (1897); "brown" according to R. M. Beck's field-notes. Bill light blue with a black streak down the center of the culmen and no basal yellow spot. Legs and feet bluish slate-color with claws black.

Wing 214–226 mm.; bill 46–54; tarsus 33.

ADULT FEMALE: Similar to the male but somewhat smaller. Wing 205–213 mm. The top of the head is slightly more brownish and less iridescent, and the speculum is much less brilliant.

YOUNG IN FIRST PLUMAGE before primaries are grown have the head almost like the adult's, but the rest of the plumage is dull brown all over with the spots on the lower parts very indistinct.

YOUNG WITH FIRST PLUMAGE COMPLETE: Lower abdomen without prominent black-and-white bars and the speculum the same color as the primaries, or with only small metallic spots on outer web of second or third secondaries. The posterior white border of the speculum as in adult, and the black inner bar more or less developed also.

DISTRIBUTION

THIS is another species confined to the high Andean regions of Peru, Bolivia and northern Chile. In Peru it has been found about Lake Junin, where it breeds in March and May (Jelski, *fide* Taczanowski, 1886; von Berlepsch and Stolzmann, 1902; Brewster-Sanford collection). Whitely found it common in the lagoons of Tungasuca, south of Cuzco, in June (P. L. Sclater and Salvin, 1869), and

MAP 65. Distribution of Puna Teal (*Anas puna*)

about Lake Titicaca it is also a fairly common bird, as well as a breeder (J. A. Allen, 1875; Menegaux, 1910; Brewster-Sanford collection). In Bolivia it is found only about Lake Titicaca.

The records for Chile are all for the northern parts, notably for Tarapaca, where it breeds, at Sitana, Sacaya and Cancoso (P. L. Sclater, 1886; James, 1892; Lane, 1897). Philippi (1888) has recorded it from as far south as Antofagasta.

GENERAL HABITS

This Andean species, which is closely related to the Argentine Gray Teal (*Anas versicolor*), is practically unknown so far as its life-history is concerned. It inhabits the high Andean plateaus (12,000 feet) of Peru and northern Chile, living chiefly in pairs. It is most abundant about the great lakes of Peru, notably Junin and Titicaca, being at the former the commonest duck (Jelski, *fide* Taczanowski, 1886). The breeding season is extremely irregular, as with all *Anatidæ* inhabiting these same regions. Jelski found them nesting at Lake Junin in September, and a large series taken there by R. M. Beck (Brewster-Sanford collection) in spring shows three males with large sex organs on March 31; one taken on March 23 labeled "not large"; one taken on March 26 with slightly swollen testes; one March 27 with small testes. Among the females in March two had organs classed as small, two as "distinct," one as "swelling," and one was immature. Birds taken in late July and August were either breeding or sexually mature. In northern Chile Lane (1897) found them breeding in January and February.

Concerning the nest Jelski (*fide* Taczanowski, 1886) says it is placed in dry situations somewhat removed from the water among tufts of grass called *surado*. The nest is of the usual duck type, and the clutch, he says, numbers ordinarily only five. The eggs, according to Sclater (1886) are larger and more pointed than those of the Sharp-winged Teal (*Anas oxyptera*) and of a pale fulvous-white color. They measure 58.4 by 44.4 mm.

The stomachs of three Puna Teal collected by Lord William Percy at Lake Junin in April were examined by Mr. W. L. McAtee of the U.S. Biological Survey (MS.). They contained mostly vegetable substance, seeds of pond-weeds and sedges with a few egg-cases of water beetles and insect cocoons.

Lord Percy told me that the male's voice reminded him somewhat of the male Gadwall's but it was less harsh. He did not hear the female quack.

No Puna Teal have ever been brought to other countries in a live state so far as I have discovered.

END OF VOLUME II